Kew Bulletin

PUBLISHED FOR THE ROYAL BOTANIC GARDENS, KEW

FORMERLY THE "BULLETIN OF MISCELLANEOUS INFORMATION"

No. 3, 1957

NOTES ON MIMOSOIDEAE : IV.

J. P. M. Brenan

The introductory comments made to part III of these notes apply also to this part (see Kew Bull. **1957,** 75 (1957)).

Dichrostachys (*DC.*) *Wight et Arn.*

In Kew Bull. **1956,** 188 (1956) I discussed the name *Dichrostachys cinerea* Wight et Arn. I there made the assumption that *Mimosa cinerea* L., Sp., Pl., ed. 2, 1505 (1763), was a later homonym of *Mimosa cinerea* L., Sp. Pl., ed. 1, 517 (1753), and thence deduced that *Dichrostachys cinerea* should be based on *Desmanthus cinereus* Willd. (1806), and thus that *Dichrostachys cinerea* (Willd.) Wight et Arn. does not antedate *D. glomerata* (Forsk.) Chiov., which I accepted as the correct name of the species widespread in tropical Africa.

Subsequently I had a letter from Mr. J. E. Dandy containing most valuable additional information, and indicating that the evidence upon which I had based the discussion referred to above had been incomplete and that my deductions were wrong. After investigating the matter anew in the light of Mr. Dandy's letter, I am in entire agreement with him about it. The present note is largely based on his evidence, for which I am deeply grateful to him.

Linnaeus in the first edition of his Species Plantarum (1753) named *two* species *Mimosa cinerea.* One (p. 517, no. 10) is based on the Plukenet plant referred to in Kew Bull. **1956,** 188 (1956) ; the other (p. 520, no. 25) is the basis of *Dichrostachys cinerea* (L.) Wight et Arn. Linnaeus makes no mention of this oversight in the corrections to the Species Plantarum ; but he must have noticed it later because he makes the necessary nomenclatural adjustment in his Systema Naturae, ed. 10, vol. 2 (1759). Here he retains the name *M. cinerea* for species no. 25 (p. 1312), and substitutes the name *M. cineraria* for species no. 10 (p. 1311). As Linnaeus himself was the first to choose one of his simultaneously published homonyms for retention, his choice must stand ; and *Mimosa cinerea* is therefore the first legitimate name for the *Dichrostachys* complex.

In my paper in Kew Bull. 1956, referred to above, I suggested that *D. cinerea* might not be specifically distinct from *D. glomerata*. Believing that the latter was the earlier name, I could, from the standpoint of African botany, make the suggestion, while there was no urgency to decide finally about its correctness. Now that *D. cinerea* has been shown to antedate *D. glomerata*, the position has altered.

Bentham in Trans. Linn. Soc. **30,** 382 (1875) kept *D. cinerea* and *D. nutans*, i.e. *D. glomerata*, as distinct species, although he realised that they were very closely related. He maintained them on account of the glands along the leaf-rhachis being less stipitate in *D. cinerea* than in *D. nutans*, and of the smaller leaflets and flowers and narrower pods of the former. A careful examination of the rich and varied African material at Kew shows that all these points alleged to be characteristic of *D. cinerea* can be found in African specimens, and that, conversely, pods and leaflets as wide as those of *D. glomerata* can sometimes be found in Indian specimens. The glands along the leaf-rhachis of *D. cinerea* from India are also not always as shortly stipitate as Bentham implied. I see no valid reason, therefore, for maintaining *D. cinerea* and *D. glomerata* as distinct species. The African plant must therefore bear the name *D. cinerea* and the two subspecies recognised in Kew Bull. **1956,** 187–188 (1956) must be renamed as follows :—

Dichrostachys cinerea (*L.*) *Wight et Arn.*, Prod. Fl. Ind. Or. 271 (1934).

subsp. **cinerea.**

Mimosa cinerea L., Sp. Pl., ed. 1, 520 (1753).

Dichrostachys glomerata (Forsk.) Chiov. : see Brenan in Kew Bull. **1956,** 187 (1956) (as to subsp. *glomerata* only), also Baker f., Leg. Trop. Afr. 807–8 (1930), and Benth. in Trans. Linn. Soc. **30,** 382 (1875).

subsp. **nyassana** (*Taub.*) *Brenan*, comb. nov.

Dichrostachys nyassana Taub. in Pflanzenw. Ost.-Afr. **C,** 195 (1895).

Dichrostachys glomerata (Forsk.) Chiov. subsp. *nyassana* (Taub.) Brenan in Kew Bull. **1956,** 188 (1956).

Xylia *Benth.*

Dr. A. R. Torre (in Mendonça, Contribuições para o Conhecimento da Flora de Moçambique **2,** 93–5 : 1954) recognised two species of *Xylia* occurring in Moçambique, *X. africana* Harms and *X. mendoncae* Torre, the latter being described as new. Dr. Torre did not describe his *X. africana*, nor did he say how *X. mendoncae* differed from it ; *X. mendoncae* was compared only with *X. schliebenii* Harms. However, there is an isotype of *X. mendoncae* at Kew, and also three of the six specimens cited by Dr. Torre under *X. africana*, and a fourth at the British Museum (Natural History) ; so that it is possible to form a clear idea of the two species.

The material cited by Dr. Torre under *X. africana*, as far as it has been seen, appears to belong to one species, and I agree with his contention that it is specifically distinct from *X. mendoncae*. I cannot, however, agree

with his interpretation of *X. africana*. The latter was originally based on four syntypes, *Holtz* 1065, *Busse* 57 and *Engler* 3622, all from the Pugu Hills in Tanganyika, and *Busse* 2477 from Lindi District, also in Tanganyika. The originals of these were at Berlin and are now no longer in existence, but there is fortunately a duplicate of one of them, *Busse* 2477, in the East African Herbarium at Nairobi, and a fruiting specimen, *Semsei* 1843, has been collected in the Pugu Forest Reserve, at or near the type-locality of the first three syntypes of *X. africana*. These, taken in conjunction with Harms's excellent description of *X. africana* and the figure accompanying it (in Engl., Bot. Jahrb. **40,** 20–21 : 1907), make it certain that *X. africana* Harms has its leaflets sparsely puberulous or almost glabrous beneath, and cuneate or rounded but not subcordate at base. Now, *X. africana* in Dr. Torre's sense has leaflets shortly but densely pubescent beneath and rounded and usually distinctly subcordate at base. In fact *X. mendoncae* appears to be very closely related to true *X. africana*, while *X. africana* in Dr. Torre's sense is a distinct species for which no name is available. In recognition of Dr. Torre's useful work on the *Leguminosae* of Southern Tropical Africa, I propose to name it *X. torreana*.

Xylia torreana *Brenan*, sp. nov. ; affinis *X. africanae* Harms, ramulis juvenilibus et rhachidibus foliorum dense pubescentibus vel tomentellis, foliolis brevius petiolulatis basi rotundatis et plerumque distincte subcordatis subtus breviter sed satis dense pubescentibus differt.

Arbor parva [vel mediocris], 6 [–15] m. alta, [cortice griseo.] *Ramuli* juveniles dense fulvo-pubescentes vel -tomentelli, serius glabrescentes et cortice griseo vel brunneo-griseo obtecti. [*Stipulae* valde caducae, lineari-subulatae, 6–7 mm. longae, tomentellae.] *Folia* bipinnata, unijuga ; petiolus [2–] 3–3·5 [–7] cm. longus, [juventute ut ramuli juveniles vestitus], serius ± dense et persistenter puberulus, apice glandula sessili circiter 0·75–1 [–2] mm. diametro ornatus ; pinnae rhachidibus [5–] 7–10 [–14] cm. longis ut petiolus vestitis, apud paria foliolorum glandulosis ; foliola 3–6-juga, 1·5–3 mm. longe petiolulata, [ovato- vel] obovato-elliptica vel nonnunquam obovato-oblonga, chartacea vel subcoriacea, apice plerumque obtuse acuminata nonnunquam subacuta, basi rotundata et saepius subcordata, supra primo praesertim in nervis sparse puberula mox omnino glabrata, [subtus primo dense velutina], serius dense pubescentia vel puberula, costa supra impressa subtus prominenti, nervis lateralibus utroque costae latere 7–11 cum rete venularum utrinque sed praesertim subtus prominulis. [*Inflorescentiae* capitatae, axillares et singulae vel geminatae vel racemosim dispositae, capitulis circiter 1·5–2 cm. diametro, pedunculis 2–3·5 cm. longis dense fulvo-velutinis ; bracteolae involucelli prope apicem pedunculi positae, lanceolatae, velutinae, 2–4 mm. longae ; receptaculum incrassatum, ellipsoideum, velutinum ; bracteolae interflorales 4 mm. longae, apice spathulato-dilatatae et ibi 1 mm. latae, inferne lineares. *Flores* lutei, subsessiles vel brevissime (usque ad 1 mm.) pedicellatae. *Calyx* 4–4·5 mm. longus, praesertim in lobis 5 subacutis 1·5 mm. longis 1 mm. latis pubescens. *Corolla* 5 mm. longa, lobis 5, 2·25 mm. longis 0·75 mm. latis subacutis extra appresse pubescentibus, tubo lineis pilorum longitudinalibus exceptis glabro. *Stamina* 10, filamentis 8–10 mm. longis,

antheris 0·5–0·6 mm. longis, 0·6 mm. latis, glandula caduca apice coronatis. *Ovarium* pubescens, 3 mm. longum, 1·5 mm. latum. *Stylus* glaber, 8 mm. longus.] *Legumina* ambitu ut videtur variabilia, plus minusve dolabriformia, 7 [–12] cm. longa, (4–) 4·5 [–8] cm. lata, extra plus minusve velutina. *Semina* circiter [3–] 5 [–8], applanata, [12–15 mm. longa, 10–11 mm. lata, brunnea, arecolo centrali 6–8 mm. longo 3–5 mm. lato.]

Portuguese East Africa. Manica e Sofala : Madanda Forest, 120 m., fl. 5 Dec. 1906, *Swynnerton* 1023 (BM) :—a somewhat large tree with creamy flowers : vernacular name (Chindao) " mukushi ". Same locality, Sept.–Oct. 1911 (fl. & frt.), *Dawe* 463:—small to medium tree. Buzi, Mucheve, 12 Sept. 1946 (fl. & frt.), *Simão* 893 (K, photo.) :—vernacular name " mecuchi ". Mossurize, between Spungabera and Chibabava, 10 Nov. 1943 (fl.), *Torre* 6129 (K, BM) :—tree 6–15 m. high with ovoid crown ; flowers yellow ; abundant in the " hiemisilva ". Maringua's village, 10 km. N. of the Sabi (Save) R., 180 m., 23 June 1950 (frt.), *Chase* 2244 *in S. Rhod. Govt. Herb.* 29098 (K, holotypus) :—6 m. tree.Inhambane : between Vilanculos and Funhaloura, 21 May 1941 (frt.), *Torre* 2721 (K, BM) :—tree 6–8 m., in open woodland on dry sandy soils.

Southern Rhodesia. Urungwe District : Mensa Pan 19 km. S. of Chirundu, 25 Mar. 1956, *Goodier* 59 :—large tree, much branched ; grey bark ; fruit a large velvety pod. Mtoko District : Nyangombi R., Mkota Reserve, 29 Dec. 1950 (very young frt.), *Whellan* 490 *in S. Rhod. Govt. Herb.* 31179 :—" must flower late November–early December ". Chipinga District : E. bank of Sabi R. near the Sabi–Lundi junction, 240 m., 11 June 1950 (frt.), *Wild* 3484 *in S. Rhod. Govt. Herb.* 28266 :—with mopane on alluvial soils near river ; tree 10 m. Lower Sabi, Mahenyas, 4 June 1951 (frt.), *Whellan* 500 *in S. Rhod. Govt. Herb.* 33262.

Transvaal. Kruger National Park : S.E. of Klopperfontein on Portuguese border, c. 490 m., 30 Apr. 1953, *v.d. Schyff* 2907 :—tree about 6 m. high. Wambia, 27 Apr. 1954 (frt.), *v.d. Schyff & Marais* 3678 :—tree up to 10 m. high, with dark green crown.

Acacia *Mill.*

Acacia eriocarpa *Brenan*, sp. nov. ; inter species africanas floribus spicatis ob aculeas dissitas cum *A. ataxacantha* DC. et *A. macrostachya* Reichb. ex DC. comparanda, sed ab iis et etiam speciebus aliis cognatis foliolis multo majoribus, stipulis latissimis, floribus extra tomentosis, leguminibus extra tomentosis distinctissima.

Arbor [parva vel mediocris]. [*Ramuli* juveniles dense tomentosi,] vetustiores plus minusve glabrescentes, epidermide griseo, brunneo vel nigrescente haud vel vix desquamante obtecti. *Aculei* inter nodos dissiti, uncinati, usque ad circiter 5 mm. longi, cum ramulis concolores. [*Stipulae* haud spinescentes, late et oblique ovati, tomentosi, 5–7 mm. longi, 4–6 mm. lati.] *Folia* : petiolus 1·2–4 cm. longus, primo tomentosus, serius plus minusve glabrescens, subtus aculeis uncinatis usque ad 3 mm. longis armatus, supra glandula 1–2·5 mm. longa ut videtur pulviniformi ornatus ; rhachis folii 4–10 cm. longus, ut petiolus vestitus et armatus, infra par supremum pinnarum glandula unica praeditus ; pinnae 4–6–jugae, rhachidibus (2·5–) 4–7·2 cm. longis pubescentibus inermibus; foliola cujusque pinnae 4–15–juga, oblique elliptico-oblonga (vel terminalia obovata), plerumque 7–17 mm. longa, 3·5–9 mm. lata, apice saepius mucronata vel subacuta, basi asymmetrica latere antico rotundata latere postico late cuneata, [juvenilia supra pubescentia, subtus dense pubescentia], matura supra glabra vel sparse pubescentia, subtus plus minusve appresse pubescentia vel glabrata, costa subcentrali, nervis lateralibus venisque utrinque satis obviis. *Flores* spicati, [spicis ex axillis foliorum in ramulis hornotinis singulatim vel usque ad ternatim exorienti-

bus, 4–5 cm. longis, 0·5–1·3 cm. pedunculatis, pedunculis et axibus tomentosis] ; spicae frutiferae usque ad 8·5 cm. longae. [*Bracteolae* tomentosae, lineari-lanceolatae, 3 mm. longae, medio 0·5–0·6 mm. latae, apice acutae. *Calyx* obconicus vel campanulatus, 3·5 mm. longus, extra tomentosus, quinquelobatus, lobis 1 mm. longis triangulari-acutis. *Corolla* sursum ampliata, 4–4·5 mm. longa, extra praesertim in lobis appresse tomentosa, quinquelobata, lobis 1–1·25 mm. longis basi circiter 1·25 mm. latis. *Stamina* numerosa, filamentis circiter 5–6 mm. longis, basim versus inter sese irregulariter connatis et imo basi breviter tubulosis ; antherae circiter 0·2 mm. latae, saltem aliquae apice glandula caduca juventute coronatis. *Ovarium* tomentosum, circiter 2 mm. longum, 0·5 mm. latum, stipite circiter 1·5 mm. longo suffultum.] *Legumina* subcoriacea, anguste oblonga vel oblongo-elliptica, recta, 7–14 cm. longa, 1·8–2·4 cm. lata, basi stipitata, apice saepius obtusa, pallide brunnea, extra molliter tomentosa, glandulis numerosis minimis atropurpureis sessilibus inter pilos immixtis. *Semina* rotundata, applanata, 6–7 mm. diametro, areolo centrali parvo circiter 3 mm. longo 2·5 mm. lato.

Southern Rhodesia. Wankie District : Wankie, 11 Dec. 1934 (fl.), *Eyles* 8287 :— small tree. Urungwe District : 16 km. S. of Chirundu, 26 Mar. 1956, *Goodier* 63 :— small to medium-sized tree. Beside the main road about 18 km. S. of Chirundu, 9 May 1956 (frt.), *Goodier* 81 (K, holotypus) :—tree, associated with *Combretum elaeagnoides*, *Holmskioldia spinescens* and *Markhamia acuminata*.

On account of the spicate flowers and scattered prickles, this new species is easily placed in that small group of African acacias which E. G. Baker, Leguminosae of Tropical Africa, 819, called Series V. This group comprises *A. ataxacantha* DC., *A. macrostachya* Reichb. ex DC. and *A. hereroensis* Engl., as well as the more recently described *A. chariessa* Milne-Redhead. Baker also has *A. lugardae* N. E. Br., but that is a synonym of *A. ataxacantha* var. *australis* Burtt Davy.

Within " Series V " however *A. eriocarpa* is unusually isolated, and cannot be said to have an especially close relationship with any one of the species already mentioned. From all of them it is abundantly distinct in several striking characters, notably the exceptionally large leaflets, the very broad stipules, recalling those of *A. latistipulata* Harms, and the conspicuous tomentum on the outside of the calyx, corolla and pods. Furthermore the staminal filaments may be seen on dissection to become irregularly connate among themselves towards the base, or even at their extreme base to be very shortly tubular. In this feature there is a parallelism with *A. ogadensis* Chiov. It might be suggested that the staminal structure of *A. eriocarpa* indicates that it should be placed in the *Ingeae* rather than the *Acacieae* ; but in every way, except for the slight tendency to connation of the filaments, *A. eriocarpa* is so obviously an acacia that I cannot regard a single anomalous character as enough to justify its exclusion, especially as the anomaly is already parallelled in *A. ogadensis* and also *A. albida* Del.

Like *A. chariessa*, *A. eriocarpa* is at present only recorded from Southern Rhodesia.

Acacia kirkii Oliv. in Fl. Trop. Afr. **2,** 350 (1871).

The purpose of this note is to discuss the relationship of *A. kirkii* with *A. mildbraedii* Harms. The pods of both are somewhat moniliform, but the segments of those of *A. kirkii* have a conspicuous conical projection on

the side of each, which is entirely lacking in *A. mildbraedii*. Comparison of typical *A. kirkii* with *A. mildbraedii* shows that this distinction is unquestionably a true one. When the pods are lacking, however, it is difficult if not impossible to separate the two, although typical *A. kirkii* of Northern Rhodesia does not seem to attain so great a height as does typical *A. mildbraedii* in the presumably more favourable climate of southern Uganda. If this were all it might be convenient to leave the two as distinct although closely related species. The main difficulty is encountered when material, variously identified with *A. kirkii* or *A. mildbraedii*, from Kenya and Tanganyika is studied. Hardly any of it is typical of either, but collectively it comprises a range of pods from those similar to *A. kirkii* except that the projection on the segments are rather less prominent, to others identical with those of *A. mildbraedii* except that each segment has a little central pimple. In other words, if *A. kirkii* and *A. mildbraedii* are maintained as distinct species, then it becomes extremely difficult to decide to which of the two the Kenya and Uganda material should be referred, unless an arbitrary and artificial dividing line is drawn between them. Although the projections along the pods of *A. kirkii* are remarkable and indeed unique among the acacias of East Africa, the evidence indicates that they are not of major taxonomic importance, and that *A. kirkii* and *A. mildbraedii* should be considered as a single species, although divisible into various taxa of lesser rank.

At first sight it might be assumed that *A. kirkii*, taken in this new wide sense, shows in its pods a simple clinal pattern from south to north, from strong projections on the pods in the southern part of its range to absence of projections in the north. This may be partially true, but detailed consideration of its geographical range shows that it is apparently broken by major discontinuities. Thus, going from south to north, *A. kirkii* is found in Angola, Bechuanaland and along the middle Zambesi valley and the Luangwa valley in Rhodesia. From here there is a gap northwards until it reappears in central Tanganyika (north of the central railway), from where there are scattered localities to the region of Nairobi in Kenya. It is apparently absent from the southern part of the Belgian Congo, the northern part of Northern Rhodesia, Nyasaland, Portuguese East Africa and southern Tanganyika. It is common in southern Uganda, from Kampala westwards to the region of Lake Albert in the eastern Belgian Congo, and extends southwards into Ruanda-Urundi and the Kagera valley in the extreme north-western corner of Tanganyika Territory. It should be noted that the Kagera is about 250 miles distant from the nearest locality for *A. kirkii* in central Tanganyika, and that the Uganda area is separated by more than that distance from Nairobi. Since these areas are moderately well collected, it is probable that these discontinuities are genuine. The range of *A. kirkii* thus falls into three parts :—

1. Angola, Bechuanaland and Northern Rhodesia.
2. Central and north-eastern Tanganyika and central Kenya.
3. Uganda, eastern Belgian Congo, Ruanda Urundi and north-western Tanganyika.

It is possible that there are further discontinuities, but those listed above appear reasonably certain at the moment. In the following proposed

rearrangement of *A. kirkii* and *A. mildbraedii*, it can be seen to what extent the subordinate taxa, recognised on morphology, correspond with geography.

Acacia kirkii *Oliv.*

subsp. **kirkii**

Legumina obscure vel prominenter venosa, venis nonnunquam prominulis, 1–2·5 cm. lata, stipite 0·5–2·5 cm. longo ; articulus quisque leguminis medio verruca conica plus minusve prominenti usque ad 2–5 mm. alta praeditus.

var. **kirkii**

Legumina 1–1·3 cm. lata, stipite 0·7–1·3 cm. longo suffulta ; articulus quisque leguminis medio verruca conica prominenti (2–) 3–5 mm. alta praeditus.

Northern Rhodesia. Southern Province : Batoka country, July–Oct. 1860 (fl., frt.), *Kirk s.n.* (K, holotypus speciei). Kasungula, sandy to clay loam soils by riverside, 1070 m., Mar. 1932, *Trapnell* 1055 :—flat-topped tree 6 m. high.

var. **intermedia** *Brenan*, var. nov.

[*A. kirkii* (non sensu strictissimo)—Harms in Warburg, Kunene-Sambesi Exped. Baum, 243, fig. 97 (244) (1903)].

A. verrucifera Harms in Warburg, Kunene-Sambesi Exped. Baum, 17 (1903), *nomen subnudum.*

Legumina plerumque prominenter venosa, nonnunquam obscure venosa, 1·2–2·5 cm. lata, stipite 0·5–2·5 cm. longo suffulta ; articulus quisque leguminis medio verruca saepius parum prominenti usque ad 2 mm. alta, nonnunquam usque ad 5 mm. alta praeditus ; legumina angustiora (1·2–1·5 cm. lata) verrucis minoribus usque ad 2 mm. altis.

Kenya. Kiambu District : Kabete, isolated trees near a dam, 1830 m., 19 May 1947 (frt.), *Bogdan* 536 :—flat-topped tree c. 8 m. high. Same locality, Aug. 1956, *Ivens* 792 :—tree 10 m. high with yellowish peeling bark. Nairobi to Ngong Hills, alongside stream in valley, 1710 m., 9 Dec. 1947 (frt.), *Bogdan* 1425 (K, EA) :—tree 15 m. high. Nairobi, Athi Plains, in valley near river, 1520 m., Aug. 1933 (fl., frt.), *van Someren in C.M.* 2700 (K, holotypus varietatis) :—flat-topped thorn tree ; flowers white. Same locality, 1520 m., Aug. 1935, *Napier* 5144 (EA).

Tanganyika. Mbulu District : Tlawi (Thlawi) Hills on high plateau, 1980 m., 30 Aug. 1932, *B. D. Burtt* 4279. Nzega District : about 8 km. S. of Igunga, in grey rather heavy soil, probably liable to occasional waterlogging, not common but occurring locally in patches, 22 July 1949 (frt.), *Doggett* 125 :—V-shaped tree 6–9 m. high, flat-topped ; bark peeling, exposing a green layer ; reported to produce a white gum. Singida District : Matelele, 21 Sept. 1927 (frt.), *B. D. Burtt* 1635. Dodoma District : Logi Mbuga, Chipogoro (? Chipogolo), 104 km. S. of Dodoma, 18 Apr. 1956, *Disney* 56/4B (K, holotypus varietatis) :—4–6 m. high or more, several-stemmed ; used for gum by natives. District uncertain : Kimagai Lake, 31 Jan. 1937 (fl., frt.), *Mr. & Mrs. Hornby* 751. Without exact locality, *Busse* 267, 166, pro parte (cum *A. albida* Del. mixta).

Bechuanaland. Sepako Lake, 21 Apr. 1931 (frt.), *Pole Evans* 3317 (13).

Northern Rhodesia. Luangwa Valley, Tapeka's village, R. Mwunyamazi, 1 Oct. 1933 (frt.), *Michelmore* 621 :—large bush or small flat-topped tree ; bark reddish-brown or green.

Angola. Huila District : Humbe, 1144 m., 7 June 1937 (frt.), *Gossweiler* 10870 :—shrub 2 m. high on banks of R. Cacoluvar. Cubango District : on the Cubango near Cavanga, 15 Nov. 1899 (fl., frt.), *Baum* 407.

var. **sublaevis** *Brenan*, var. nov.

Legumina 1–1·2 cm. lata, stipite circiter 0·5–1·3 cm. longo suffulta.

Uganda. Acholi District : Aswa R., Gulu–Kitgum road, *Eggeling* 775 *in F.H.* 1161 (K, holotypus varietatis, EA, isotypus) :—flattish-topped acacia on banks of Aswa R.; flowers white, with orange " halo " of anthers ; fruits moniliform, brown when ripe, often twisted ; spines on lower parts of tree up to 5 cm. long, white and straight.

It is probable that the specimen cited under *A. kirkii* by Gilbert & Boutique in Fl. Congo Belge **3,** 163 (1952) (Belgian Congo, Lac Albert : Mahagi-Port, *Gilbert* 612) is to be referred to var. *sublaevis*. The pods are said to be 0·8–1 cm. wide, and each joint is said to have a small prominence in the middle of each face.

There is a Kenya specimen at Kew (Machakos, in *Acacia–Commiphora* grassland, riverside on calcareous red-brown soil, tree 12 m. high with green peeling bark, 11 Mar. 1953, *Trump* 39) that may well also be var. *sublaevis*, but as there is but one very ancient pod partially represented by four connected joints, it is unwise to be certain.

The var. *sublaevis* is altogether similar to subsp. *mildbraedii* except for the presence of small papillae on the pod. It must be admitted that the line of division between subsp. *kirkii* and subsp. *mildbraedii* is an artificial one.

subsp. **mildbraedii** (*Harms*) *Brenan*, subsp. et comb. nov.

A. mildbraedii Harms in Mildbraed, Wiss. Ergebn. Deutsch. Zentr.-Afr.-Exped. 1907–08, **2,** 234 (1910).

Legumina prominenter venosa, (0·8–) 1–1·5 cm. lata, stipite circiter 0·5–1 cm. longo suffulta, articulis verrucas omnino carentibus.

Belgian Congo. Ruanda–Urundi, Nyakatale, N.W. of Gabiro, c. 1500 m., 4 Dec. 1944 (frt.), *Germain* 2904.

Uganda. Toro District : Bunyangabo, S. of L. Kabaleka, 900 m., 23 Sept. 1931 (frt.), *Osmaston* 1323 (EA) :—semi-flat-topped tree 15 m. high ; bark green with papery peel. Ankole District : Kagera R. between Nsongezi and Kakitumba, in riverine forest, 24 Nov. 1930 (frt.), *B. D. Burtt* 2897 (K, EA) :—tree 15–24 m. high ; bark greenish and scaling. Kigezi District : Rubabu, riverside, 1370 m., Jan. 1951 (fl., frt.), *Purseglove* 3524 (K, EA) :—flat-topped tree to 15 m. ; fragrant globose inflorescences with red corollas and white stamens : vernacular name (Lukiga) " omukinga ". N. Kigezi, Kebisoni, riparian, 1200 m., Sept. 1949 (fl., frt.), *Dale* U. 697. Masaka District ? : Lwera Plain near L. Victoria, 11 Mar. 1936 (frt.), *Michelmore* 1291 :—handsome, tall, slender, flat-topped tree ; bark green and peeling ; forming grove at edge of swamp. Masaka/Mengo Districts : Katonga R., on Masaka–Kampala road, swamp-forest clump liable to river flooding, 1140 m., 2 Dec. 1951 (frt.), *Trapnell* 2184 :—graceful, spreading-crowned acacia ; bark greenish, peeling on upper and middle branches. Mengo District : mile 30 on Hoima road from Kampala, 1170 m., 22 Jan. 1931 (fl., frt.), *Hill* 38 :—thorny tree ; flowers yellowish-white. Without locality, *Lindeman* 537 (K, EA).

The syntypes of subsp. *mildbraedii* are *Mildbraed* 343 (Ruanda-Urundi), *Mildbraed* 1887 (Belgian Congo), and *Holtz* 1712 (Tanganyika Territory). I have not seen them, and the originals were destroyed at Berlin. Harms's description of *Acacia mildbraedii* is so good, however, that there can be no doubt of its identity.

As the subspecies and varieties proposed are recognised by their pods, only specimens showing them are cited above. Specimens lacking them can, however, often be named with a fair probability of correctness from the locality. The more important extensions of range possibly additional to those based on the cited specimens above are :—

var. *intermedia* ? Tanganyika, Shinyanga District, Uduhe, between Kisapu and Mango, *B. D. Burtt* 5518. Tanganyika, Kondoa District, near Kandaga, *B. D. Burtt* 1215 (K, EA). Tanganyika, Dodoma District, Fufu, *Wigg* 983 (K, EA).

subsp. *mildbraedii* Belgian Congo, District of Lacs Édouard and Kivu : various specimens cited from this area in Fl. Congo Belge **3,** 164 (1952). Uganda, Teso District, Bulanga, Bwamba, *A. S. Thomas* 737. Tanganyika, Bukoba District, between Itara and Kakindu, *Holtz* 1712 (not seen, but a syntype).

The following key to the subspecies and varieties of *A. kirkii* may be useful :—

Joints of pod with a large or small wart-like projection in the middle of the side of each (subsp. *kirkii*) :

Pods 1–1·3 cm. wide :

Projections from joints prominent, (2–) 3–5 mm. high . var. *kirkii*

Projections from joints small, up to 2 mm. high . . var. *sublaevis*

Pods 1·2–2·5 cm. wide . . . . . var. *intermedia*

Joints of pod without any central projections. Uganda, ?Tanganyika subsp. *mildbraedii*

Acacia clavigera *E. Mey.*, **A. robusta** *Burch.* and **A. usambarensis** *Taub.*

During an investigation, for the Flora of Tropical East Africa, into the amount of variation and the geographical range of *Acacia usambarensis*, it became evident that in Kenya and Tanganyika the species was generally uniform and constant, but that further south it became considerably more variable. Certain specimens from Portuguese East Africa, obviously closely allied to *A. usambarensis*, also showed an equally close similarity to some South African specimens determined as *A. robusta* Burch.

The South African material of *A. robusta* at Kew was far from uniform, and the first stage in the investigation was to classify this. Actually it proved that two distinct entities, A and B, in my view separate species, were confused under the name *A. robusta*. The principal distinctions are as follows :—

A (*Acacia robusta*, sens. strict.)	B (*Acacia clavigera*, sens. strict.)
Spines often stout and long, reaching 7–11 cm.	Spines up to about 6·5 cm.
Leaf-rhachides glabrous or almost so.	Leaf-rhachides ± densely pubescent.
Pinnae 2–4 pairs.	Pinnae often 5–6 pairs.
Leaflets mostly 10–15 pairs per pinna.	Leaflets mostly 13–25 pairs per pinna.
Peduncles and calyx-lobes glabrous or almost so.	Peduncles and calyx-lobes ± densely pubescent.
Pods straight or slightly curved, 1·8–2·5 cm. wide.	Pods falcate, 1·3–1·7 cm. wide.
Seeds lying transversely in the pod.	Seeds lying longitudinally in the pod.

In addition to the above distinguishing characters, of which the indumentum and the pods are the most significant, a generally greater

robustness shown by " A ", together with the often larger leaflets, is helpful in spotting it. *Acacia robusta* was described by Burchell, Trav. **2,** 442 (1824) from a specimen (no. 2265) which he had collected at Litakun, Bechuanaland ; this is at Kew, and although it is in flower and shows no pods, it is clearly "A", since it has glabrous leaf-rhachides and peduncles, mostly 3 but sometimes 4 pairs of pinnae, and spines up to 8 cm. long.

It should be emphasised that the distinguishing characters given under " B " above apply to South African material ; the leaf-rhachides in particular are by no means always pubescent elsewhere, as we shall see.

A. robusta proper has so far been found only in the Transvaal and Bechuanaland ; reports of its occurrence elsewhere refer mainly to " B ". Recent gatherings of the true *A. robusta* include *Repton* 1863 (Pretoria), *Gerstner* 5377 (Subiaco, P.O. Boyne, near Pietersburg), *Galpin* 14932 (Naboomspruit) and *Letty s.n.* (Meintjeskop, Pretoria, Sept. 1944). The true plant was also figured in Fl. Pl. S. Afr., t. 851 (1942) and described there by Dr. I. C. Verdoorn. *A. robusta* is distinct from " B " and even more so from *A. usambarensis*, and we need not discuss it further here.

We are left with the entity " B ", for which there is fortunately a name available : *Acacia clavigera* E. Mey., Comm. Pl. Afr. Austr. 168 (1836). The type of this is a specimen collected by Drège near Port Natal, of which there is a duplicate at Kew, showing clearly the pubescent leaf-rhachides and the pods narrower than those of *A. robusta.*

A. clavigera has been kept as a synonym of *A. robusta* by Burtt Davy, Man. Fl. Pl. Transv. 342–3 (1932) and also by Verdoorn (*l.c.*, *supra*). However it is interesting to note that the idea of *A. robusta* in its old wide sense being a mixture of two taxonomic entities has already been expressed : Dr. L. E. W. Codd, Trees and Shrubs of the Kruger National Park (Bot. Survey Memoir No. 26) 48 (1951), wrote : " it appears that the trees growing along the coast of eastern Cape Province and Natal and into the Kruger National Park form a distinct variety, with more numerous leaflets and longer pods. Also, the whole tree is larger than the typical trees of the northern Cape and Transvaal bushveld, reaching a height of 40 to 50 feet along the Sabi and Levubu Rivers."

In the first paragraph of this note, the resemblance was mentioned between *Acacia usambarensis* and certain South African specimens named *A. robusta.* These latter, according to the revised concept of *A. robusta* proposed above, are all *A. clavigera* ; *A. robusta* proper does not enter into the problem. However, the differences and relationship between *A. usambarensis* and *A. clavigera* demand very careful consideration.

A glance at specimens of *A. usambarensis* and *A. clavigera* shows both certain similarities and also some rather obvious differences. The differences, when studied more closely, appear to be mainly in the leaves and pods. A number of specimens in the Kew herbarium were therefore analysed for the following characters :—

1. Leaf-rhachis indumentum,
2. Number of pinnae per leaf,
3. Width of leaflets,
4. Width of pods.

The specimens analysed could, according to the results, be placed in three categories :—

1. *A. usambarensis*, typical,
2. *A. clavigera*, typical,
3. Intermediate between *A. clavigera* and *A. usambarensis*.

The geographical distribution is also revealing :—

1. Kenya and Tanganyika, 27 specimens : *A. usambarensis* 25, intermediates 2 (in Lindi and Masasi Districts in southernmost Tanganyika), *A. clavigera* 0.

2. Portuguese East Africa, Northern and Southern Rhodesia, 15 specimens : *A. usambarensis* 2, intermediates 7, *A. clavigera* 6.

3. South Africa, 17 specimens : *A. usambarensis* 0, intermediates 3, *A. clavigera* 14.

Let us now examine the actual differences. Typical *A. usambarensis* and *A. clavigera* are treated for this purpose as units, but the intermediates are dealt with individually.

It should be emphasised that these apparent intermediates are so called purely on the morphological evidence given by the specimens. Very careful observation in the field is much wanted so that their occurrence and status may be judged more securely.

If we recall the figures given above for the occurrence of intermediates in the various groups of territories, the evidence, though more is wanted, seems to indicate that there are no barriers, either ecological or physiological, preventing free interbreeding between *A. clavigera* and *A. usambarensis*. In Portuguese East Africa intermediate specimens have been as or more frequently collected than either of the two species, and elsewhere intermediates occur where only one of the species has so far been recorded. This apparent inconsistency may be due to inadequate collecting, but may be more easily and reasonably explained by postulating a central, predominantly mixed population. For these reasons, it seems more in accordance with what evidence we have to treat *Acacia clavigera* and *A. usambarensis* as belonging to a single species, with two geographical subspecies connected by intermediates. The earlier name is *A. clavigera*. It is probable from the description that *A. sambesiaca* Schinz in Denkschr. Akad. Wien, Math. Nat. **78,** 416 (1905), based on Menyharth 1003 from Boroma in Portuguese East Africa, is one of these intermediates. It can hardly be typical *A. usambarensis*, under which it was sunk by E. G. Baker, Leg. Trop. Afr. 846 (1930), since Schinz described the petiole and leaf-rhachis as hairy and the leaflets as ciliate.

Acacia clavigera *E. Mey.*, Comm. Pl. Afr. Austr. 168 (1836).

subsp. **clavigera**

[*Acacia robusta* (non Burch.)—Burtt Davy, Man. Fl. Pl. Transv. 342–3. (1932), pro parte ; Verdoorn in Fl. Pl. S. Afr. t. 851 (1942), pro minore parte ; Codd, Trees and Shrubs of the Kruger National Park (Bot. Survey Memoir No. **26**), 48, fig. 43 a, b (1915), pro parte].

Rhachides foliorum typice ± dense pubescentes. Foliola (1·75–) 2–3·5 mm. lata. Legumina 13–17 mm. lata.

	Leaf rhachis glab. or subglab.	Leaf rhachis ± densely pubesc.	Pairs of pinnae	Width of leaflets (mm.)	Pod width (mm.)
A. usambarensis, typical	+		Range : (2–) 3–7 (–10) (average 5·3)	1–2	Range : 7–12 (average of 11 specimens 8·5)
A. clavigera, typical		+	Range : (2–) 3–5 (–6) (average 4·2)	(1·75–) 2–3·5	Range : 13–17 (average of 5 specimens 14·6)
Intermediates. Name of territory, specimens, etc.					
Tanganyika, *Busse* 2337, Lindi, 30.4.1903		+	4–5	1·5–2·2	9–10
Tanganyika, *Gerstner* 7207, Masasi District, Ndanda, 20.8.1949		+	about 5	2–3·25	9–11
Territory ?, *W. P. Johnson s.n.*, Mfungu, July ...	somewhat pubescent		4·5	1·4–2·5	8 (but young)
Portuguese East Africa, *W. H. Johnson s.n.*, Buzi, 24.1.1907	+		2–6	1·75–2·75	—
P.E.A., *Torre* 5810, Tete, Mandie, 27.8.1943 ...		+	3–5	1·5–2	11–12
P.E.A., *Hornby* 2727, near Tete, 8.6.1947		+	3–5	1·25–2·5	9–10
P.E.A., *Torre* 7071, Lourenço Marques, near Magude, 7.1.1948		+	4–6	1·4–2	11–13
N. Rhodesia, *Trapnell* 1440, Gwembe, Mar. 1934 ...		+	4–5	1·5–2	8–9 (but young)
Transvaal, *C. A. Smith* 6581, April 1933	+		3–4	2·5–3·5	c. 15
Zululand, *Eyles* 7645, Empangeni, 24.10.1933 ...		+	4–5	1–1·75	c. 13
Eastern Cape, *Acocks* 13596, Komgha, 17.4.1947 ...	+		4–5	1–1·75	13–17

The subsp. *clavigera* is found in southern Portuguese East Africa (Lourenço Marques, *Hornby* 1000, *Gomes e Sousa* 3792, 3812, Maputo, *Hornby* 2515), Southern Rhodesia (Ndango, *Wild* 2751 *in S.R.G.H.* 22599), the Transvaal (Waterpoort, *Codd* 4341, Mabaza, Zoutpansberg District, *Lang in Herb. Transvaal Mus.* 32341, Sabi Game Reserve, *Letty* 50, Kruger National Park, *Codd & Verdoorn* 5488, *Codd* 4403, *v.d. Schyff* 742, 3165), Zululand (Mkuzi R., *Galpin* 133117, Hlabisa, *Ward* 1478), eastern Cape Province (S.W. of Tombo P.O., *Codd* 9289).

subsp. **usambarensis** (*Taub.*) *Brenan*, subsp. et comb. nov.

Acacia usambarensis Taub. in Engl. Pflanzenw.-Ost.-Afr. **C,** 195, t. 20H, (1895).

Rhachides foliorum typice glabra. Foliola 1–2 mm. lata. Legumina 7–12 mm. lata. Cum subsp. *clavigera* plantis ut videtur intermediis conjuncta.

Subsp. *usambarensis* has been frequently collected in Kenya and Tanganyika Territory. As the identification of *Acacia usambarensis* has usually given no difficulty in these territories, it seems unnecessary to cite specimens from them. Typical subsp. *usambarensis* also occurs in Portuguese East Africa (Goruro, *Dawe* 522, between Mogincual and Quixaxe, *Andrada* 1251), but has not so far been found further south.

Acacia gerrardii *Benth.* [" garrardi "] in Trans. Linn. Soc. **30,** 508 (1875).

A. hebecladoides Harms in Notizbl. Bot. Gart. Berl. **3,** 195 (1902), *nomen nudum* ; in Engl., Bot. Jahrb. **36,** 208 (1905), *cum descr.*

Mr. F. White, of the Imperial Forestry Institute, Oxford, pointed out to me this synonymy, with which I agree. The purpose of this note is, however, not to discuss this, but to draw attention to two wide-podded variants of *A. gerrardi*, which are worth recognising taxonomically :—

var. **gerrardii**

Legumina 6–11 (–12) mm. lata. Ramuli juveniles ± dense pubescentes. Spinae rectae, nonnunquam recurvae.

This is the common form of the species, occurring throughout its range, from Natal to the Sudan, and westward to Nigeria.

var. **latisiliqua** *Brenan*, var. nov.

Legumina 12–17 mm. lata. Ramuli juveniles ± dense pubescentes. Spinae saepe uncinatae vel recurvae, nonnunquam rectae.

Kenya. Kiambu/Fort Hall Districts : Thika, *Lewis* 25 (EA) :—bark dark, reticulated. Nairobi District : Karen Coffee Estate, 26 Apr. 1933 (young frts.), *C. G. Rogers* 636 :—tree 9 m. high and 1·2 m. girth ; very rough bark. Nairobi, 1740 m., Mar. 1934 (fl., frt.), *Napier* 6026 (K, EA) :—spreading tree : bark dark, rough ; very sweet-scented cream flowers ; about 9 m. high. Forest Office, Nairobi, 15 Dec. 1950, *Dale* H 130/50 (EA). Machakos District: Machakos, 1620 m., 11 Oct. 1947 (frt.), *Bogdan* 1249 :—plains of Maruba R. with black heavy soil and *Acacia nilotica* subsp. *subalata* dominant ; tree 4·5–6 m. high. Sir F. Wilson's Farm near Machakos, 1620 m., 7 Feb. 1952, *Trapnell* 2215 (K, holotypus) :—dark-foliaged thorn tree with spreading crown ; gregarious in valley on red soil. Mua Hills road, 1750 m., 2 Mar. 1953 (fl.), *Trump* 47 (K, EA) :—tree 6 m., top rounded ; bark deeply fissured, dark brown ; in *Acacia* grassland with *Commiphora*, some *Combretum* and *Rhus*, on a light red-brown soil. Nairobi–

Mombasa road, Kiu Hills, 1520 m., 23 July 1953 (frt.), *Trump* 72 :—tree 4·5 m. high with deeply furrowed bark ; in *Acacia* grassland with *Combretum* spp. on an orange-brown sandy soil. Machakos/Masai Districts : Ulu, *Lewis* B (EA) :—4–7·5 m. high ; bark strongly and unpleasantly scented, dark brown and longitudinally fissured. Masai District : Ngorika near Kajiado, c. 1680 m., 3 Nov. 1948 (frt.), *Vesey-Fitzgerald* 213 :—usually rather tall, 12 m. high tree of erect growth with ascending stout branches from low down ; bark grey, fluted, thick, lamellated ; slash white, smelling of garlic.

Tanganyika. Kondoa District : near Thlawa, 1370 m., 17 Dec. 1927 (frt.), *B. D. Burtt* 860 (K, BM). Mbeya District : Mbeya, 25 Feb. 1934, *Michelmore* 972 (K, EA) :—flat-topped tree. Mbeya, 25 Feb. 1934, *Michelmore* 969 (K, EA) :—flat-topped tree of rather stiff growth, abundant below 1680 m. in S.E. end of Rukwa Rift ; flowers white.

Trump 47 is without pods, and is quoted with some doubt on the strength of its general facies and the presence of strongly hooked spines, a feature that is shown by the Kenya specimens of var. *latisiliqua*, but is not, or less markedly, present in var. *gerrardii*. Tanganyika specimens of var. *latisiliqua* have the straighter spines of var. *gerrardii*, and these specimens may later have to be separated from var. *latisiliqua*.

var. **calvescens** *Brenan*, var. nov.

Legumina 12–15 mm. lata, glabra vel fere glabra. Ramuli juveniles glabri vel fere glabri. Spinae saepe uncinatae vel recurvae.

Kenya. Teita District : Teita Hills, 910 m., 1934 (fl.), *Bally in C.M.* 12013 :—used formerly by Arabs to cure their slaves from malaria.

Tanganyika. Mwanza District : Mwanza, Kalemera, 1160 m., 3 Apr. 1953 (fl.), *Tanner* 1349 :—in groups on hard-pan ; tree 6 m. high with corrugated bark ; flowers white, aromatic : vernacular name (Kisukuma) " challe ". Musoma District : Musoma, 1220 m., 3 Sept. 1925 (fl.), *Wigg* 323 :—tree to 10 m. by water-side : vernacular name " mukonge ". Mbulu District : 25 June 1937 (frt.), *Mr. & Mrs. Hornby* 3 (EA) :—tree 9–12 m. h. with round crown and black bark. Near Mbulu, 1770 m., Aug. 1953 (frt.), *Eggeling* 6689 (K, holotypus, EA, isotypus) :—tree 7·5–10 m. high. Hills N. of Massodisch at Dongêt, 1680 m., 5 Sept. 1932, *B. D. Burtt* 4278 (BM) :—large trees with very dark spirally ribbed bark which when cut gives off an unpleasant odour. Kondoa District : Kikori, 1370 m., 12 Aug. 1929, *B. D. Burtt* 2189 (K, BM, EA) :—in riverine flats ; bark evil-smelling when cut. Dodoma District : Kazikazi, c. 1220 m., 18 Aug. 1931 (frt.), *B. D. Burtt* 1784 (K, EA) :—tall, robust tree to 18 m. high ; crown regular, balloon-shaped ; young bark used as string by natives ; common in riverine wooding with *Newtonia hildebrandtii*. Usule near Mkalama, 15 Dec. 1933, *Michelmore* 824 :—small tree of bushy spreading growth in valley with *Acacia* and *Albizia* spp. ; flowers white.

It is not certain that the specimens cited under var. *calvescens* all belong to a single taxonomic entity. At present no one specimen shows both flowers and fruit, and there is a fair amount of variation in the foliage. More good material is needed.

Acacia turnbulliana *Brenan*, sp. nov. ; *A. gloveri* Gilliland aperte affinis, foliolis angustioribus lineari-oblongis, haud 1·5–2 mm. latis et oblongo-ellipticis, nervis lateralibus subtus haud cernendis et non (ut in *A. gloveri*) prominulis, indumento ramulorum juvenilium et rhachidum foliorum densiore et longiore, in ramulis circiter 0·5–0·75 mm. nec 0·25–0·4 mm. longo, pedunculis tomentosis, leguminibus ut videtur rectis densissime griseo-velutinis nec puberulis differt. Ab *A. edgeworthii* T. Anders. (*A. socotrana* Balf. f.), cui etiam etsi minus propinque cognata, spinis in ramulis floriferis longioribus (plerumque 3·5–6 cm. longis), pedunculis longioribus et calycibus et corollis majoribus distinguenda.

Arbuscula 0·5 [–1·2] m. alta, valde applanata, usque ad 3·6 m. lata, ramis fere horizontaliter patentibus. *Ramuli* juveniles dense et persistenter pubescentes vel subtomentosi, pilis patentibus 0·5–0·75 mm.

longis lutescentibus usque griseis, validi, primo luteo-virides, serius brunnei vel griseo-brunnei, lenticellis parvis pallidis punctiformibus notati, epidermide hic illic rimoso sed haud desquamante. *Spinae* stipulares geminae, rectae, patentes vel paullum deflexae, (2–) 3·5–6 [–10 fide *Dale K.* 752] cm. longae, basi 2–3 mm. diametro, tandem griseae et praesertim basim versus more ramulorum vestitae. *Folia* : petiolus 1–2·2 cm. longus, dense pubescens, supra glandula rotundata parva 0·3–0·6 mm. diametro circiter 4–8 mm. super basim petioli saepe ornatus ; rhachis (1·5–) 4–8 [–11] cm. longus, ut petiolus vestitus, glandulis minimis inconspicuis inter paria pinnarum 1–3 suprema praeditus ; pinnae (4–) 8–14 [(–17)]-jugae, 0·7–2·2 [–3] cm. longae ; foliola 8–18 [–24]-juga, lineari-oblonga, 2·5–5 mm. longa, 0·5–0·8 [–1·25] mm. lata, discoloria, siccitate supra atrobrunnea subtus griseo-viridia, apice obtusa, margine breviter ciliata, aliter glabra vel fere glabra, costa basi obliqua folioli subcentrali, nervis lateralibus haud cernendis. *Flores* capitati, albi, pedunculis ex ramulis juvenilibus et vetustioribus singulatim vel fasciculatim exorientibus 1·5–3 cm. longis tomentosis, involucellis brunneis 2–2·5 mm. longis extra paullum pubescentibus basalibus vel in dimidio inferiore pedunculi positis. *Bracteolae* spathulatae, 2–3 mm. longae, obtusae vel subacutae, praesertim margine pubescentes. *Calyx* 3–3·75 mm. longus, tubo extra sparse et appresse pilosulo, lobis 5–6 apice rotundatis 1 mm. longis et latis extra pubescentibus. *Corolla* 4–5·5 mm. longa, lobis 5–6, 1·5 mm. longis et 0·5 mm. latis extra dense albido-tomentosis. *Staminum* filamenta 6–9 mm. longa. *Antherae* 0·2 mm. latae, saltem aliquae glandula caduca primo ornatae. *Ovarium* subsessile, glabrum, 1 mm. longum, 0·6 mm. latum. *Stylus* glaber, 8–10 mm. longus. *Legumina* ut videtur nondum plene matura, recta, fide *Gillett* 13364 cylindrica, densissime griseo-velutina, basi apiceque attenuata, 9–12·5 cm. longa, 0·9–1·1 cm. lata ; semina ut videtur haud matura.

KENYA. Northern Frontier District : between Muddo Gashi and Garissa, 152 m., 24 Jan. 1943 (fl.), in dry scrub, *Bally* 2144 :—low, spreading acacia : vernacular name (Somali) " seruan ". 88 km. N. of Wajir, in scrub, Jan. 1949 (fl. buds), *Dale* K. 752 :—flat bush 1·2 m., with young shoots yellow-green ; thorns 10 cm. ; flowers dirty white. 23 km. N.E. of Wajir, on red sandy soil over limestone, 270 m., 27 May 1952 (fl. & frt.), *Gillett* 13364 (K, holotypus) :—c. 0·5 m. tall, very flat-topped ; flowers white, visited by sunbirds ; pods cylindrical : vernacular name (Somali) " gulu ".

Acacia turnbulliana is closely related to *A. gloveri* Gilliland in Kew Bull. **1951,** 139 (1951). The differences between them, given also in the Latin diagnosis above, are in the indumentum, leaflets, and pods. The hairs on the young branchlets of *A. turnbulliana* are longer (about 0·5–0·75 mm.) and denser than in *A. gloveri* (about 0·25–4 mm.), so that they may be described as subtomentose, and the indumentum on the rhachides of the leaves is correspondingly denser. The peduncles of *A. turnbulliana* are tomentose, not shortly pubescent, and the leaflets are narrower and the prominulous lateral nerves to be seen on the lower surface in *A. gloveri* are invisible in *A. turnbulliana.* The pods of *A. turnbulliana* are very densely clothed with grey hairs, giving a velvety and somewhat glossy look to the surface of the straight pods. In *A. gloveri* the pods are curved and only sparsely and shortly puberulous.

It should be borne in mind that *A. gloveri* may well be a synonym of the earlier-described *A. bricchettiana* Chiov. in Annali di Botanica **13,** 396 (1915), also from the Ogaden.

Acacia turnbulliana commemorates Mr. R. G. Turnbull, C.M.G., formerly Provincial Commissioner of the Northern Frontier Province, Kenya, and now Chief Secretary in the Government of Kenya. Mr. Turnbull, a keen student of the Somali and Boran names and uses for the plants of northern Kenya, and an active supporter of botanical research, by helping Mr. I. R. Dale and Mr. J. B. Gillett to travel and collect in northern Kenya, has been instrumental in bringing to light not only the present but several other species hitherto unknown to science.

A SECOND SPECIES OF UROMYCES ON BRITISH SPURGES.

R. W. G. Dennis & N. Y. Sandwith

On a recent visit to Southern Ireland one of us (N.Y.S.) collected on *Euphorbia hiberna* L. a conspicuous rust fungus which appears to have been hitherto unrecorded in the British Isles. The only species of *Uromyces* at present listed on *Euphorbia* spp. in this area is *U. tuberculatus* Fuck., on *E. exigua* L., which has aecia, uredosori and coarsely tuberculate teleutospores in pustules on a localised mycelium. The rust of *E. hiberna*, which we identify provisionally with **U. tinctoriicola** *P. Magn.*, is a microspecies with teleutosori developed in very large numbers over the whole of the infected shoot. Its teleutospores are ornamented with very crowded minute warts which can only be clearly seen on spores examined in the dry state.

U. tinctoriicola has been recorded on *E. tinctoria*, *E. glareosa*, *E. gerardiana*, *E. nicaeensis*, *E. hiberna* and *E. polycaula* from Spain through central and south Europe to Persia. We were at first inclined to identify the Irish rust with *U. sublaevis* Tranzschel, recorded on several of the above hosts and said to differ from *U. tinctoriicola* mainly in the more crowded finer warts of its teleutospores. Authentic material of the former species has not, however, been available for comparison and of the two collections so named by continental authors at Kew one, Sydow, Uredineen 2669, on *E. glareosa* in Roumania, has teleutospores indistinguishable from those of *E. tinctoriicola* while the other, on *E. tristis* in Poland, leg. A. Wroblewski, has more finely ornamented teleutospores very like those of the Irish collection. Săvulescu (1953) recognises both species in Roumania but cites them on the same host species and the difference between them appears to be extremely small. In these circumstances, and as *U. tinctoriicola* is the older name and as it has already been adopted for a similar rust of *U. hiberna* by Fragoso (1925) in Spain, we have thought it best to assign the Irish fungus to that species for the present.

British collection :

Lane above Cloonee Loughs, Kenmare River, Kerry, 17.6.1952, *N. Y. Sandwith* 3986.

Fragoso, R. G. (1925). Flora Iberica, Uredinales Tomo 2.
Săvulescu, T. (1953). Monographia Uredinalium Reipublicae Popularis Romanicae 2.

THE REHABILITATION OF NARCISSUS CANTABRICUS DC.

Abílio Fernandes
Botanical Institute, University of Coimbra, Portugal.

Introduction

In 1601 Clusius (Rar. Pl. Hist. : 166) published the figure and the description of a *Narcissus* with procumbent leaves and a white flower to which he gave the name of *Pseudo-narciss. juncifol. III. albo flor.* The plant must have come from the Cantabrian Mountains, the author stating that John Mouton of Tournai had sent him drawings of this *Narcissus*, bulbs of which had been given to the latter by a friend who had dug them up in those mountains when returning from Gallicia.

Linnaeus (Sp. Pl. 1 : 290, 1753), although mentioning the *Pseudo-Narcissus juncifolius* 2, *flavo flore* of Clusius, makes no reference to the plant with a white flower.

De Candolle (in Redouté, Lil. 8 : t. 486, 1816), mistakenly convinced that the species grew in the Cantabrian Mountains, called it *Narcissus cantabricus*, stating the Clusius' description and figure published in " Rariorum Plantarum Historia ", as well as the remaining pre-linnaean synonymy.

Dunal (in Mem. Acad. Sci. Montpellier, 1 : 9, *t.* 6, 1847) gave the plant the name of *Narcissus Clusii* which was later adopted by Kunth (in Walp., Ann. 1 : 836, 1848 ; Enum. Pl. 5 : 857, 1850) and Willkomm & Lange (Prod . Fl. Hisp. 1 : 151, 1861).

In 1812 Salisbury (in Trans. Hort. Soc.) proposed the creation of the genus *Corbularia* which, however, was described only later by Haworth (Monogr. : 1819). Considering it as belonging to this new genus, the latter author called Clusius' plant *Corbularia cantabrica*, this name being also used by Nyman (Consp. Fl. Europ. : 713, 1878–1882).

Durieu (in Duchartre, Rev. Bot. 2 : 425, 1847 ; Expl. Sci. Algér. Bot. 2 : *t.* 47, *fig.* 2, 1848), when studying the flora of Algeria, described the species *Corbularia monophylla* which is chiefly characterized by having in general only one very slender leaf and a white and fragrant flower.

Battandier & Trabut both agree with Durieu in Flore d'Alger (174, 1884) as well as in Flore de l'Algérie (249, 1895).

T. Moore (fide Maire in Bull. Soc. Hist. Nat. Afr. Nord, 20 : 38, 1929) also considered the taxon described by Durieu as a distinct species, but, not admitting the genus *Corbularia*, he transferred it to *Narcissus* and thus it became known as *N. monophyllus* (Dur.) T. Moore.

Baker (in Gardn. Chron. : 1869 ; in Burbidge, Narcissus : 67, 1875 ; Handb. Amaryll. : 3, 1888) reduced the species of Durieu to the category of variety, naming it *Narcissus Bulbocodium* L. var. *monophylla*. The name of the variety was afterwards corrected by Hooker to *monophyllus* in the text of plate 5831 of vol. 96 (1870) of Curtis's Botanical Magazine. Baker (Handb. Amaryll. : 3, 1888) included *N. Clusii* Dunal in the synonymy of the var. *monophyllus*, and as to the *Corbularia cantabrica* Haw. he said it was a form with white flowers known only from old drawings.

Maire (in Bull. Soc. Hist. Nat. Afr. Nord, 20 : 38, 1929) considered *N. monophyllus* as a distinct species, distinguishing in it the var. *foliosus* Maire which differs from the type by having more leaves (3 to 8) and larger flowers with longer pedicels. This author admits that *N. cantabricus* DC. is distinct from *N. monophyllus* (Dur.) T. Moore. The var. *foliosus* would be distinguishable from the first species by the corona slightly dilated towards its margins and not irregularly incised-crenate, and by the erect leaves.

Jahandiez & Maire (Cat. Pl. Maroc, 1 : 138, 1931) reduce *N. monophyllus* to the category of subspecies of *N. Bulbocodium* L. and continue distinguishing var. *foliosus* Maire in it.

Bowles (Handbook of Narcissus : 210–214, 1934) reports with detail the history of *N. cantabricus* DC., taxon where he very rightly includes *N. Clusii* Dunal and *N. monophyllus*. The author, however, makes no mention whether the taxon should be considered as a separate species or as a subspecies or variety of *N. Bulbocodium* L.

In 1936 Maire & Wilczek (in Bull. Soc. Hist. Nat. Afr. Nord, 27 : 80, 1936) described the var. *kesticus* of *N. Bulbocodium* L. ssp. *monophyllus* (Dur.) Maire, so called because it is found in Mount Kest in the Anti-Atlas. According to the authors, it is distinguishable from the type by the exserted stamens and greenish-white perianth.

In face of the above exposition we can see that the *Narcissus* with white flowers is distinguished as a distinct taxon, to which the category of species, of subspecies or even variety has been attributed. Which of these points of view should be considered the most adequate ? The present work was done not only to answer this question, but also to contribute towards a better understanding of the subgenus *Corbularia*.

Material and Technique

The observations were carried out on the plants mentioned below which had the following names and numbers in our cultures :

No. 14—*Corbularia monophylla* Dur. var. *foliosa*—Morocco.

No. 156—*Narcissus Clusii* Dunal—Fuente de la Bicha, Granada, Spain.

No. 384—*Narcissus Bulbocodium* L.—Valongo, Portugal.

No. 930—*Narcissus monophyllus* (Dur.) T. Moore var. *typicus* Maire—Sierra de las Filabres, Almeria, Spain, in the crevices of rocks, among small bushes of *Cistus albidus* and *Ulex parviflorus*, alt. 900 m.s.m., 24-II-1950, legit *Pinto da Silva et al.*

Besides this material, which we used for studies in the living state, karyological observations and hybridizations, we also examined the specimens kept in the Herbaria of the Botanical Institutes of Madrid, Barcelona and Coimbra, as well as those in the National Agronomic Station at Sacavem. We also had the opportunity of studying a most interesting specimen which was kindly sent to us by Dr. G. Taylor, Director of the Royal Botanic Gardens at Kew.

In 1951 plant No. 930 produced a flower, the pollen of which was used to fertilize many flowers of culture No. 384. The flower of plant No. 930 was in turn fertilized with pollen from a sample of No. 384. Immed-

iately after they flowered, plants F_1 were self-fertilized or crossed with one another.

We used root-tips, young ovules and pollen grains to determine the number and study the morphology of the chromosomes.

The root-tips were fixed in Navashin or La Cour 2 BE and stained with gentian violet, in accordance with the classical technique. The figures of the ovules were obtained following the acetic-orcein technique (La Cour in Stain Technol. 16 : 169–174, 1941), after treatment with a solution of colchicine at 0·01 per cent. The metaphases of the first mitosis of the pollen grains were observed in slides stained with aceto-carmine after fixing the anthers in acetic-alcohol (1 : 3).

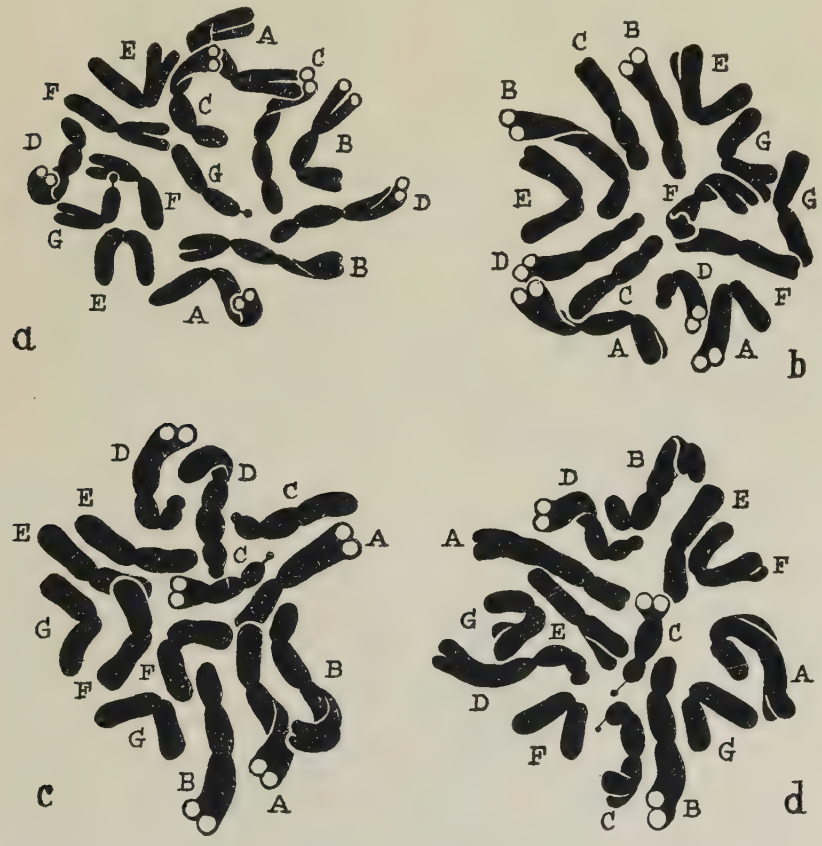


FIG. 1.—Polar views of metaphases in cells of root-tips. *a*, *N. Bulbocodium* No. 384. *b*, *N. Clusii* Dunal No. 156. *c*, *d*, *N. monophyllus* (Dur.) T. Moore var. *typicus* Maire No. 930. The pairs of chromosomes are designated by letters A–G which in the chromosomic formulae show the respective symbols. × 3.200.

Meiosis was studied in the pollen mother cells. The anthers were fixed in La Cour 2 BE and the sections, 18μ thick, were stained with gentian violet.

Finally, the percentages of bad pollen were determined by examining the slides obtained by dissociation of the anthers in drops of aceto-carmine.

Observations

(a) Number and Morphology of Chromosomes

In previous works (Fernandes in Bol. Soc. Brot. ser. 2, 7 : 59, 1931 ; *op. cit.* 9 : 31, 1934 ; *op. cit.* 11 : 115–117, 1936 ; *op. cit.* 23 : 14, 1949 ; Fernandes & Neves, *op. cit.* 15 : 47, 1941), we showed that the chromosome complement of the diploid forms of *N. Bulbocodium* with yellow flower could be represented by the following formula:

$2n=14=2\ lm(A)+2\ Lp_1(B)+2\ Lp_2(C)+2\ Lp_3(D)+2\ PP(E)+2\ PP(F)+2\ Pp'(G).$

The plants from Valongo used in the present work belonged to the general type, as was found out by studying the metaphases and anaphases obtained either in root-tips (fig. 1a) or in young ovules.

We also found 14 chromosomes in the root-tips of plants Nos. 156 (fig. 1*b*) and 930 (figs. 1 *c*, *d*). The detailed study of these chromosomes led us to establish the following chromosome complement for these plants with white flower :

$2n=14=2\ lm(A)+2\ Lp_1(B)+2\ lp'(C)+2\ Lp_3(D)+2\ PP(E)+2\ PP(F)+2\ PP(G).$

Comparison of the chromosome complement of the yellow flower plant with that of the white flower shows that :

(1) Chromosome lm(A) of the complement of the second plant shows the arm l slightly longer ;

(2) Chromosome $Lp_1(B)$ of the plant with white flower has the arm L also slightly longer ;

(3) Chromosome $Lp_2(C)$ of the first complement is substituted for an element lp′ ;

(4) In the second complement a PP chromosome appears instead of a chromosome Pp′(G).

In plant No. 156 as well as in No. 930 meiosis occurs in an entirely normal way, with formation of 7 bivalents (fig. 2).

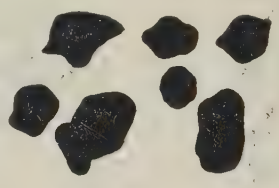


Fig. 2.—*N. Clusii* Dunal No. 156. Polar view of the first PMC metaphase. × 3.200.

In the polar views of metaphases in the root-tips of several hybrids resulting from the cross of Nos. 384 and 930, we always found 14 chromosomes (fig. 3 *a-d*). Among these we could identify elements lm (A_b), Lp_1 (B_b), Lp_2 (C_b), and Pp′ (G_b) from plants with yellow flower and lm (A_c), $Lp_1(B_c)$, lp′ (C_c) and PP (G_c) from those with white flower.

In *Corbularia monophylla* var. *foliosa* we counted 28 chromosomes (fig. 4), the morphology of which can be represented by the formula :

$$2n=28=4\ lm+4\ Lp_1+4\ lp'+4\ Lp_3+12\ PP$$

Thus we see that var. *foliosa* is a tetraploid form, corresponding its chromosome complement to double of that of plants Nos. 156 or 930.

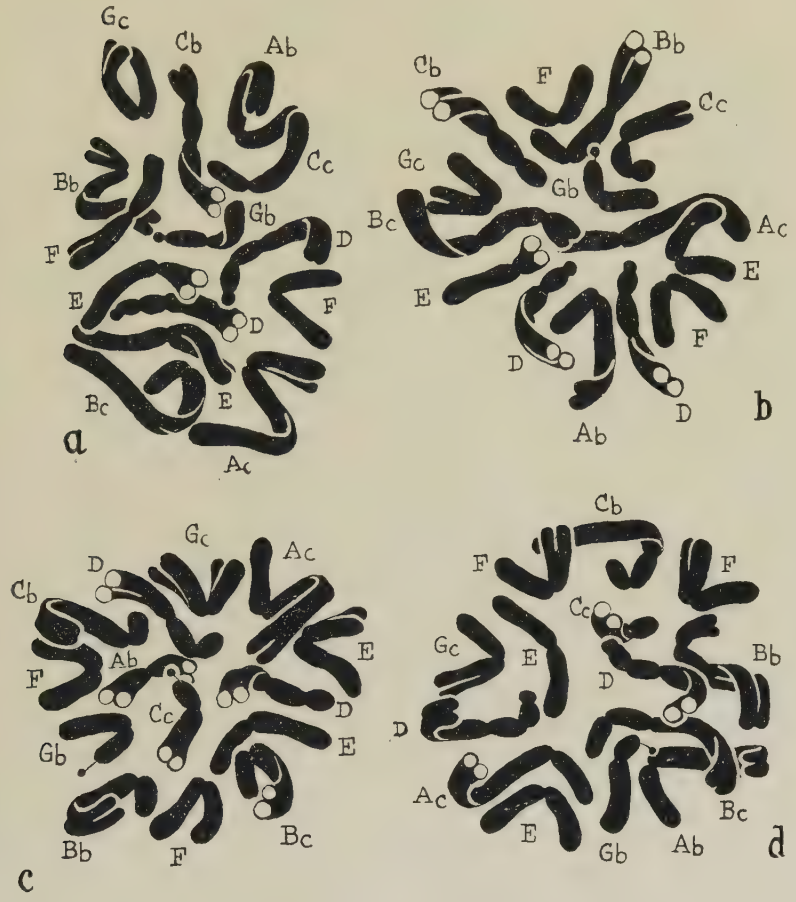


Fig. 3.—Polar views of metaphases of mitosis in root-tips of hybrids between plants with yellow flower and white flower. The chromosomes from the first plants are marked b (*bulbocodium*) and those of the second plants c (*cantabricus*). The other chromosomes are morphologically similar in both parents. Each metaphase comes from different plants. × 3.200.

Fig. 4.—*Corbularia monophylla* var. *foliosa* No. 14. Metaphase of mitosis in a root-tip. × 3.200.

(b) Analysis of Hybridizations

On 15.ii.1951 we did the cross described below, as well as the respective reciprocal :—

No. 930 ♀	×	No. 384♂
White flower		Yellow flower
One leaf to each bulb		More than one leaf to each bulb
Procumbent leaf		Erect leaves

We obtained 112 plants morphologically similar and with the following features : white flower, several leaves (more than one to each bulb) curved in inverted U or V.

The percentage of bad pollen bordered in most cases 100 per cent. When good pollen occurred this was almost always of large size, corresponding no doubt to unreduced grains.

The phenotype of the hybrids shows that the white colour of the perianth is dominant over yellow ; that the existence of more than one leaf to each bulb is dominant over the monophyllous character ; and that the leaves are intermediate between procumbent and erect.

The high percentage of bad pollen shows that meiosis must be extremely irregular and that the hybrids will be completely or almost sterile. Several crosses among hybrids were done with the purpose of solving this problem. In no case was any seed obtained. Selfpollinations gave us the same results. Sterility could, however, result from the pollen being sterile and not from sterility of the ovules. To solve this problem we fertilized 38 hybrids with the pollen (almost 100 per cent good) from a diploid plant of *N. Bulbocodium* with yellow flower. Again, no seed was obtained, and this shows that sterility also affects the female side and that meiosis originating the formation of the macrospores must also be very irregular. We conclude, therefore, that the hybrids among plants with yellow and with white flowers are highly sterile.

Discussion

(a) Taxonomy

The *Narcissus Bulbocodium* with yellow flower is extremely polymorphous. Thus, (1) the external scales of the bulb vary from whitish to very dark brown ; (2) the leaves vary from filiform to relatively large, and they can be procumbent, recurved or erect, generally more than one to each bulb ; (3) the length of the pedicel varies greatly, but the ovary is not as a rule subsessile ; (4) the size of the flower is extremely variable ; (5) the margin of the corona is in most cases entire, but plants are found having indented margins ; (6) the stamens can be included or exserted ; etc.

The plants with white flower which we examined showed that the external scales of the bulbs were always very dark brown (almost black). As to the leaves, we noted that they could also be procumbent, recurved or erect, in general more slender than those of the yellow flower plants and often one to each bulb. The pedicel is always very short, the ovary being therefore subsessile. The corona is more dilated at the throat and the margin is often crenulate.

The main differences between the two groups are summed up in Table I.

To these morphological differences should be added another of ecological nature given by Bowles (loc. cit. 211–212), as follows : " The white Hoop Petticoat still occurs in Spain on the eastward side of Gibraltar. Colonel Enever Tod sent me specimens in 1932 and tells me that it grows in stony scree, generally among small bushes and in shade, whereas the yellow N. Bulbocodium prefers open exposures and nearly always grows on a rock, often mixed with Scilla monophylla, especially on flat ledges, where their roots form a thick mat. The white plant, on the contrary, is scattered singly, or two or three together ". These observations agree with those of Mr. A. R. Pinto da Silva, of the National Agronomic Station, as the label on plant 930 reads : " in the crevices of rocks, among small bushes of *Cistus albidus* and *Ulex parviflorus* ".

Table I

Plants with yellow flower	Plants with white flower
External scales of bulb varying from whitish to dark brown	External scales of bulb always dark brown (almost black)
Pedicel ± long	Subsessile flower
Flowers not very fragrant	Very fragrant flowers
Yellow perianth	White perianth
Corona generally not expanded at the throat	Corona expanded at the throat

Given the morphological differences referred to in Table I, the ecological difference mentioned above, the fact that they present different chromosome complements (*vide* the chromosomic formulae and fig. 1) and the fact that their hybrids are completely sterile, we are of opinion that the plants with white flower should be separate from those with yellow flower and considered as a distinct species.

This point of view being, in our opinion, amply justified, the question now arises as to what name should be given to the plant.

We showed in a previous work (in Bol. Soc. Brot. ser. 2, 9 : 168, 1934) that the separation of *Corbularia* as an independent genus from *Narcissus* was not justified, considering that *Corbularia* has a similar chromosome complement to that which is found in section *Ganymedes* of *Narcissus* and, moreover, the species of the two groups hybridize very easily. Therefore, the problem of the specific name has already been solved by Bowles (*loc. cit.* 212–213), as we can see from the following passage : " If it is considered a species of Narcissus, De Candolle's name N. cantabricus would stand, as he used it in vol. viii. of *Les Liliacées*

in 1816, in the list of species of Narcissus given under t. 486, and it is therefore the earliest specific name used in conjunction with Narcissus ".

Such as *N. Bulbocodium* L., *N. cantabricus* DC. in Red. is polymorphic and we can distinguish in it the infra-specific taxa mentioned in the following key :

More than one leaf to each bulb . . . . . ssp. *cantabricus*

Leaves procumbent . . . . . var. *cantabricus*

Leaves non-procumbent (erect or recurved) :

Corona erect ; pedicel 5–8 mm. long :

Leaves 3–8 to each bulb ; perianth white 3·5–6 cm. long . . . . . var. *foliosus*

Leaves 2 to each bulb ; perianth greenish-white about 3·3 cm. long . . . . . var. *kesticus*

Corona salverform simulating the corolla of *Petunia* ; pedicel up to 5 mm. long . . . . . var. *petunioides*

Generally one leaf to each bulb . . . . . ssp. *monophyllus*

The nomenclatural history of these taxa, to which is added the description of the new variety *petunioides*, is as follows :

Narcissus cantabricus *DC.* in Redouté, Lil. 8 : t. 486 (1816).

ssp. **cantabricus**

var. **cantabricus**

Pseudo-narciss. juncifol. III. albo flor. Clusius, Rar. Pl. Hist. : 166, *f.* 2 (1601).

Corbularia cantabrica Haw., Monogr. (1819).—Munby in Gardn. Chron. : 307 (1874).—Nyman, Consp. Fl. Europ. : 713 (1878–1882).

Narcissus Clusii Dunal in Mém. Acad. Sci. Montpellier, 1 : 9, *t.* 6 (1847).—Kunth in Walp., Ann. 1 : 836 (1848) ; Enum. Pl. 5 : 857 (1850).—Willkomm & Lange, Prodr. Fl. Hisp. 1 : 151 (1861).—Verlot in Rev. Hort. 46 : 329 (1874).

var. **foliosus** (*Maire*) *A. Fernandes* comb. nov.

Narcissus monophyllus (Dur.) T. Moore var. *foliosus* Maire in Bull. Soc. Hist. Nat. Afr. Nord, 20 : 38 (1929).

Narcissus Bulbocodium L. ssp. *monophyllus* (Dur.) Maire var. *foliosus* Maire in Jahandiez & Maire, Cat. Pl. Maroc, 1 : 139 (1931).—Emberger & Maire, Cat. Pl. Maroc, 4 : 961 (1941).

var. **kesticus** (*Maire & Wilczek*) *A. Fernandes* comb. nov.

Narcissus Bulbocodium L. ssp. *monophyllus* (Dur.) Maire var. *kesticus* Maire & Wilczek in Bull. Soc. Hist. Nat. Afr. Nord, 27 : 80 (1936).—Maire in *op. cit.* 27 : 261 (1936).

var. **petunioides** *A. Fernandes* var. nov.

Bulbus ovatus, 2 × 1·3 cm., tunicis fuscis obvolutus. *Folia* 3–4, semi-teretia, flexuosa, generaliter recurvata, usque 30 cm. longa, basi longe attenuata, scapo longiora. *Scapus* cylindricus, circiter 15 cm. longus, flexuosus igitur plus minusve curvatus. *Spatha* basi vaginiformis, scariosa, pallido-brunnea, circiter 3 cm. longa. *Flos* obliquus, usque 5 mm. longe pedicellatus. *Perigonium* candidum, siccitate laete sulphureum, circiter 3·3 cm. longum. *Laciniae* coronam subaequantes a basi 5–6 mm. latae. *Corona* circiter 12 mm. longa, corolam Petuniae simulans, margine crenata. *Stamina* et *stylus* longe exserta.

Habitat in Algeria ?

Typus in Herbario Kewense.

Affinis var. kestico a qua foliis 3–4, flexuosis recurvatisque nec 2 erectis, floribus breviter pedicellatis, candidis nec albo-virentibus, laciniis latioribus et praecipue corona corolam Petuniae simulante differt.

ssp. **monophyllus** (*Dur.*) *A. Fernandes* comb. nov.

Corbularia monophylla Dur. in Duchart., Rev. Bot. 2 : 425 (1847) ; Expl. Sci. Alg. Bot. 2 : *t.* 47. *f.* 2. (1848).—Kunth in Walp., Ann. 1 : 836 (1848) ; Enum. Pl. 5 : 856 (1850).—Battandier & Trabut, Fl. Alger. : 174 (1884) ; Fl. Algérie : 249 (1895).

Narcissus monophyllus (Dur.) T. Moore (fide Maire in Bull. Soc. Hist. Nat. Afr. Nord, 20 : 38, (1929).

Narcissus Bulbocodium L. ssp. *monophyllus* (Dur.) Maire in Jahandiez & Maire, Cat. Pl. Maroc, 1 : 138 (1931).—Emberger & Maire, Cat. Pl. Maroc, 4 : 961 (1941).

Narcissus Bulbocodium L. var. *monophyllus* (Dur.) Bak. in Gardn. Chron. : 529 (1869) ; in Burbidge, Narcissus : 67 (1875) ; Handb. Amaryll. : 3 (1888).

(b) Geographical distribution, origin and evolution.

According to Bowles (*loc. cit.*), *N. cantabricus* was considered as coming from the Cantabrian Mountains, this statement being based on Clusius's information. The plant, however, was never found in those mountains or in the Pyrenees, and was only found in the southeast of Spain, Balearic Isles (fide Bowles) and in North Africa. Given this distribution, Bowles suggests that Mouton's friend may have brought the bulbs from a region in the south of Spain, and this explanation seems to us quite plausible. We have found that there are monophyllous plants in the south of Spain. In some of them the leaves are erect, while in others they are procumbent. It is therefore most likely that samples may be found in that region with several procumbent leaves to each bulb which would therefore correspond to the type. According to Dunal (*loc. cit.*), the type is also found in the region of Oran, and we think that it may be found in other places together with ssp. *monophyllus*.

According to Maire (in Bull. Soc. Hist. Nat. Afr. Nord, 20 : 38, 1929) Jahandiez & Maire (*loc. cit.*) and Emberger & Maire (*loc. cit*), the var.

foliosus (*vide* fig. 5) grows in northwest Morocco (Oued Nefifik) and in southwest Morocco (Sokrat-en-Nemra pr. Boulhaut).

Also according to Maire (in Bull. Soc. Hist. Nat. Afr. Nord, 27 : 80, 1936) ; *op. cit.* : 261 (1936) and Emberger & Maire (*loc. cit.*), the var. *kesticus* (fig. 5) is found in the west Anti-Atlas (Mount Kest).

The var. *petunioides* seems to come from Algeria from where, according to Dr. G. Taylor (*in litt.*), it may have been imported by Messrs. Van Tubergen, Haarlem, Holland.

Fig. 5.—Map showing the geographical distribution of the taxa constituting *N. cantabricus* DC.

The ssp. *monophyllus* is dispersed throughout a much wider area and is found on both sides of the Straights of Gibraltar (fig. 5).

It occurs in Spain in the region of Almeria (Sierra de las Filabres and Uleila), near Gibraltar and in the Balearic Isles (fide Bowles).

Jahandiez & Maire (*loc. cit.*) and Emberger & Maire (*loc. cit.*) refer to the following distribution in Morocco : Tingitan peninsula, east and west Rif, coastal and mountain sectors of Oran, northwest Morocco and the northern part of central Morocco.

Battandier & Trabut (*loc. cit.* : 249) state the following localities for Algeria : Miliana, Teniet-el-Haâd, Thaza, Boghar, Bau-Saâda, Aflou, Daya, Tlemcen and Oran, corresponding to the coastal regions and the inland of west Algeria.

In previous works (Fernandes in Bol. Soc. Brot. ser. 2, 13 : 532, 1939 ; *op. cit.* 23 : 204, 1949 ; *op. cit.* 25 : 121, 1951), we arrived to the conclusion that the yellow colour of the flower of the *Narcissus* should be considered an indicative feature of primitiveness. This being so, we admit that *N. Bulbocodium* is older than *N. cantabricus* DC., an idea that accords with the wider geographical distribution of the first species.

Among the taxa constituting *N. cantabricus*, ssp. *monophyllus* should be considered the most primitive as it is diploid, possesses only one leaf to each bulb and has a wider geographical area. As it is found on both sides of the Mediterranean, we should admit that it was differentiated as from a form of *N. Bulbocodium* before the opening of the Straights of Gibraltar. Comparison of the chromosome complements immediately shows that structural changes of chromosomes were at the basis of differentiation of ssp. *monophyllus*, as the chromosome complement of this can be derived from that of *N. Bulbocodium*, admitting the following :

(1) There was a reciprocal translocation between arm p of chromosome Lp_2 and arm p′ of chromosome Pp′, from which resulted a change of position of the satellite and the origin of a PP chromosome with the two arms of almost equal length.

(2) There were translocations between the distal extremity of arm L of chromosome Lp_2 and the long arms of chromosomes lm and Lp_1.

It is probable that besides these structural changes deducted by simple comparison of the chromosome complements there may have been others. We hope that the study of meiosis of the hybrids, which we have not as yet been able to pursue, will allow us to confirm the present deductions and to bring forth other structural changes that the study of the morphology of the somatic chromosomes has not yet revealed.

The irregularity of meiosis of the hybrids and, therefore, their sterility should be attributed to the structural changes of chromosomes. They have, therefore, created a barrier of sterility which must have largely contributed to the establishment of *N. cantabricus* as a distinct species.

In *N. Bulbocodium*—and the same must apply to other species of the genus—the yellow colour of the flower is due to xanthoplastids which are impregnated with xanthophyll in the course of development. There are in the perianth of *N. cantabricus* as well as in that of the hybrids between this species and *N. Bulbocodium* plastids which, however, remain colourless, thus giving in result white flowers. We must, therefore, conclude that the white colour appeared in consequence of some alteration which interfered with the chain of reactions which normally leads to synthesis of the pigment of the plastids of perianth. We do not know the nature of this alteration, as it could result from any of the structural chromosomic changes which had occurred or from a simple gene-mutation.

It is curious to see that the differentiation of plants with white flowers from others with yellow flowers has happened in almost all sections of the genus. Thus, besides having happened in *Corbularia*, it

also occurs in sections *Jonquilleae* (*N. rupicola* —→ *N. Watieri*), *Ganymedes* (*N. triandrus* var. *concolor* —→ *N. triandrus* var. *albus*), *Ajax* (*N. Pseudo-narcissus* —→ *N. alpestris*), *Hermione*, etc. In some of these cases, for instance in sections *Jonquilleae* and *Ganymedes*, this differentiation was not accompanied by structural changes which could be brought forth by studying the shape of the somatic chromosomes. On the other hand, attributing the appearance of white colour to structural changes of the chromosomes, we should have to admit that the same alteration occurred in the several groups mentioned, but there would not have been many probabilities of this happening. However, it seems to us most likely that the interruption of the chain of reactions which leads to the synthesis of the pigment of the plastids of the perianth may have resulted from gene-mutation.

Considering for instance section *Ajax*, we find that in it exist plants with entirely yellow flowers ; others with sulphurous flowers ; others with sulphurous tepals and yellow corona ; others with white tepals and yellow corona ; and others with entirely white flowers ; etc. These facts show that the genetics of the colour of the flowers of *Narcissus* must not be simple, there being many probabilities of the pigmentation being conditioned by a series of multiple alleles.

As in *N. Bulbocodium*, polyploidy is a factor that have occured also in the evolution of *N. cantabricus*. In effect tetraploidy originated var. *foliosus*, most probably from plants with one leaf.

Unfortunately we could not study the type of the species and varieties *kesticus* and *petunioides* from the karyological point of view. We cannot therefore be certain whether any of these taxa could have originated also by polyploidy.

Summary and Conclusions

Narcissus cantabricus, founded by De Candolle upon the description and the figure 2, page 166, of " Rariorum Plantarum Historia ", by Clusius, has been considered as a taxon of doubtful existence, as a synonym of *N. Clusii* Dunal, and more frequently as corresponding to *N. Bulbocodium* L. var. *monophyllus* (Dur.) Bak. The karyological studies have showed that *N. cantabricus* has a clearly different chromosome complement from that of *N. Bulbocodium*. We also saw that from the point of view of external morphology the first taxon is distinct from the second, particularly for the external scales of the bulb which are always almost black, the leaves which are generally more slender and for the white flower, subsessile, very fragrant, with the corona expanded at the throat. There are also ecological differences: *N. cantabricus* grows in the shade of small bushes, while *N. Bulbocodium* prefers open places.

In view of these differences and the hybrids of these taxa being completely sterile (not only when crossed among themselves but also when crossed with any of the parents), we arrived to the conclusion that *N. cantabricus* DC. should be considered as a distinct species from *N. Bulbocodium*. We found the following taxa in that species : ssp. *cantabricus*, with vars. *cantabricus*, *foliosus*, *kesticus* and *petunioides* ; and ssp. *monophyllus*.

In view of the morphological features and the geographical distribution, ssp. *monophyllus* must be considered the more primitive and that

which was differentiated before the opening of the Straits of Gibraltar. The karyological data show that it originated from a diploid form of *N. Bulbocodium* through structural changes of chromosomes (reciprocal translocation between arm p of a chromosome Lp and arm p′ of one other Pp′ and translocations between arm L of the same chromosome Lp and arms l and L of two other chromosomes lm and Lp), presumably accompanied or followed by gene-mutations, among which that which led to the interruption of the chain of reactions from which results the synthesis of the pigment of the plastids that gives the flower its yellow colour. It should be noted that white is dominant over yellow. The results of hybridizations also showed that the polyphyllous feature (more than one leaf to each bulb) is dominant over the monophyllous, whereas the features of procumbent and erect leaves show an intermediate heredity. The irregularity of meiosis of the hybrids and, therefore, their sterility, should be attributed to the structural changes of chromosomes and these created a barrier of sterility which must have largely contributed to the establishment of *N. cantabricus* as a distinct species.

The other taxa must have differentiated from ssp. *monophyllous*. The karyological studies showed that var. *foliosus* originated by tetraploidy.

Unfortunately it was not possible for us to study from the karyological point of view either the type or vars. *kesticus* and *petunioides*, so we could not therefore establish whether any of these taxa had originated by polyploidy.

The author is most grateful to Dr. G. Taylor, Director of the Royal Botanic Gardens of Kew for the material of var. *petunioides* ; to the Directors of the Botanic Gardens of Madrid and Barcelona and of the National Agronomic Station for the specimens of *N. cantabricus* from the herbaria of their respective institutions ; to Mr. A. R. Pinto da Silva, of the National Agronomic Station, for the bulbs of *N. cantabricus* DC. ssp. *monophyllus* which he gathered in the Sierra de las Filabres ; to my colleague Prof. Dr. J. Barros Neves for his help in documenting this work, and to Messrs. Francisco Cabral Júnior, Aníbal Saíl Sarmento and Aníbal da Conceição Santos for their help in the technical part of the work.

A RUST NEW TO THE BRITISH ISLES.

G. W. Garlick

The rust fungus **Uromyces hippocrepidis** *E. Mayor*, on *Hippocrepis comosa* L. was found by the writer in the gully, Durdham Downs, Bristol, V.C. 34, on 20th August, 1957. Only uredosori were present, amphigenous, irregularly scattered, minute, rounded, soon naked, pulverulent, brown, with minutely echinulate, globose to subglobose uredospores 20–23μ diameter, having 6–7 (–8) conspicuous germ pores.

In Monographia Uredinearum (1910) the Sydows treated the *Uromyces* on *Hippocrepis* spp. as a race of *U. anthyllidis* (Grev.) Schroet. but according to Fragoso (1925) *U. hippocrepidis* differs in having uredospores with more numerous germ pores and finer more closely spaced warts, as well as in details of the teleutospores which cannot be verified is the British collection. Comparison with uredospores from *Anthyllis vulneraria* L. seems to bear out Fragoso's opinion, though the number of germ pores is somewhat variable. *Hippocrepis comosa* is the type host of *U. hippocrepidis*. The specimen is in Herb. Kew.

Fragoso, R. G. (1925) Flora Ibérica, Uredinales Tomo 2 pp. 72–73.
Mayor, E. (1921) in Bul. Soc. Neuchâtel Sci. Nat. 45 pp. 40–44.

A NEW NAME IN RUBIACEAE.

J. R. Tennant

Arbulocarpus *Tennant*, nom. nov.

Hypodematium A. Rich. Tent. Fl. Abyss. 1 : 348 (1847) non Kunze (1833).

Arbulocarpus sphaerostigma (*A. Rich.*) *Tennant*, comb. nov.

Hypodematium sphaerostigma A. Rich. Tent. Fl. Abyss. 1 : 348 (1847) ; Hiern in Oliv., Fl. Trop. Afr. 3 : 240 (1877).

The generic name *Hypodematium* A. Rich. was applied to plants in the tribe *Spermacoceae* with dicoccous fruits, the latter splitting upwards from the base, allowing the cocci to separate and leaving the septum free. It is, however, a later homonym, being antedated by *Hypodematium* Kunze ; Flora 16 : 690 (1833)—a genus of leptosporangiate ferns.

The new name *Arbulocarpus* (ἀρβύλη—a " strong shoe coming up to the ankle ") is proposed in order to preserve to some extent, the allusion in A. Richard's name so coined " à cause de la forme de chaque valve, qui ressemble à une petite chaussure."

A NOTE ON SPHAEROCOMA (HAFUNIA).

J. B. Gillett

Sphaerocoma is a small and peculiar genus in the *Caryophyllaceae*, which occurs in South Persia, Arabia and N.E. Tropical Africa. In the course of naming plants belonging to this genus two problems have arisen.

(A) What is the relation between *Sphaerocoma* and *Hafunia*, Chiovenda, Flora Somala **1,** 90, t. 3 : 1 (1929), a monotypic genus strikingly similar to *Sphaerocoma* in appearance, but placed by Pax and Hoffman, in their treatment of the *Caryophyllaceae* in Engler's Pflanzenfamilien ed. 2. (1934), in a different tribe (*Pterantheae* instead of *Paronychieae*) ?

(B) How should specimens from the Sudan and the Hejaz be classified which have been variously assigned to each of the two species of *Sphaerocoma* but agree well with neither ?

(1) Thanks to the kindness of Prof. Pichi-Sermolli in loaning the type of *Hafunia globifera* it has been possible to compare this with that of *Sphaerocoma hookeri* and there can be no doubt that the two are conspecific. The short sterile tufts at the sides of the flowers, whose bracts (or sepals ?) develop long bristles in the fruiting stage, were considered by T. Anderson, in describing *Sphaerocoma*, to be sterile flowers but by Chiovenda, in describing *Hafunia*, to be sterile inflorescence branches. On the former view the species belongs to the *Paronychieae* ; on the latter to the *Pterantheae*. Chiovenda described *Hafunia* as having a trifid style, while in *Sphaerocoma* the style is described as bifid. However, the two flowers dissected from the type of *Hafunia* proved to have bifid styles, as did the flowers examined from *Glover and Gilliland* 692 and *Bornmueller* 161.

(2) Two species of *Sphaerocoma* have so far been described, *S. hookeri* T. Anders. from Aden and *S. aucheri* Boiss. from S. Persia. The differences between them are as follows.

S. hookeri	*S. aucheri*
a. Numerous sterile flowers or inflorescence-branches surrounding the fertile flowers in the fruiting stage.	Such sterile flowers or inflorescence-branches few or none.
b. Spines on the bracts of these sterile shoots or flowers up to 5 mm. long in fruit, much longer than their mainly scarious, flattened part and also much longer than the short spinous tip of the sepals of the fertile flower.	These spines, if present, c. 1 mm. long, recurved, shorter than the mainly green, flattened portion, not differing from the spinous tips of the fertile sepals.
c. Peduncles 12–25 mm. long.	Peduncles 3–6 mm. long.
d. Leaves up to 17 mm. long and 1·5 mm. wide.	Leaves up to 10 mm. long and 3 mm. wide.
e. Young internodes glabrous.	Young internodes scurfy.

The specimens of *Sphaerocoma* from the Sudan and Hejaz agree with *S. hookeri* in characters a. and b., which appear to be the most important,

but approach *S. aucheri* in all other respects ; they are indeed exceptionally difficult to distinguish from *S. aucheri* when the inflorescence is immature, as the spines of the sterile flowers or shoots do not appear till the fruiting stage is reached. These facts seem best expressed by assigning the Sudan and Hejaz plants to a distinct subspecies of *S. hookeri*.

(1) **S. hookeri** *T. Anders.* J. Linn. Soc. **5,** 16 t. 3 (1860).

α ssp. **hookeri**

Psyllothamnus beevori Oliv. in Hook. Ic. Pl. **15,** t. 1499 (1885).

Hafunia globifera Chiov., Fl. Somala **1,** 90, t. 3 : 1 (1929).

Aden : 450 m. 1847 *J. D. Hooker* s.n. (syntype). 1851 *Thomson* s.n. (syntype). *Beevor* s.n. (Holotype of *Ps. beevori*). 200 m. *Deflers* 520K, BM. *Schweinfurth* 103. 300 m. *Wykeham Perry* s.n.

Brit. Somaliland. Burao shillis near Heis, 10° 53′ N., 46° 54′ E., small bush with golden brown fruit heads and succulent leaves, Somali name DURAN, 16.2.1945, *Glover & Gilliland* 692 K, BM.

Somalia. Hafun, 10° 20′ N., 51° 15′ E., on dunes and sea shore, 30.1.1924, *Puccioni & Stefanini* 23 Fl (holotype of *Hafunia globifera*).

β ssp. **intermedia** *Gillett* ssp. nov.

Ramuli juniores saepius purpuraceo-lanuginosi, interdum glabri. Folia ad 10 mm. longa et 1·5 mm. lata. Pedunculi 4–8 [–12] mm. longi. Ramuli inflorescentiae steriles (sive flores steriles) multi ; spinis bractearum (sepalorum) eorum stramineis, tandem 2–4 mm. longis.

Hejaz : sea shore 16 Km. N. of Jeddah, Dec. 1939, *Trott* 51.

Sudan : Coastal region : Jebel Elba, Wadi el Sell, 20.1.1933, *Shabetai* F 1050 bis (holotype). Ssoturba Mts., 22° N., southern peak of Jebel Hotarba, 30.4.1864, *Schweinfurth* 773 K, BM. Between 900 and 1200 m., c. 21° N., 1896, *Bent* s.n. Wadi near Jebel Elba, Jan. 1933, *Palmer* 142.

Brit. Somaliland : near Berbera *Popov* 1173 BM (an immature plant which could be *S. aucheri*).

Cufodontis in Bull. J. Bot. Et. Brux. **23** suppl. p. 101 records *Hafunia globifera* from Eritrea but the specimen has not been seen.

(2) **S. aucheri** *Boiss.*, Fl. Or. **1,** 739 (1867).

Trucial Oman : Jabal Ali, Dubai, 19.7.1952, *Guest* s.n. Abu Dhabi, *Vesey-Fitzgerald* 13260/1 BM. Nr. Dubai *Popov* 501 BM.

S. Persia. Kishma island *Aucher Eloy* 4520 BM (isotype). *Bornmüller* 160 BM. Bender Abbas, 19.1.1893, *Bornmüller* 161. Jask 1906 *Pilgrim* s.n. Gunnam Isles *R. Hay* s.n.

Baluchistan : coast, Drano, 1880, *Pierce* s.n.

CONTRIBUTIONS TO THE FLORA OF AUSTRALIA: IV.

Comber's Archeria from Tasmania.

R. Melville

Among the plants collected by H. F. Comber in Tasmania in 1929–1930 was a small epacridaceous shrub, which V. S. Summerhayes recognised as a new species of *Archeria*. Seeds of this plant probably were distributed, but when M. Y. Orr came to investigate the leaf anatomy* he had only some dried material from the original collection at his command. The rather obese leaves were found to possess a remarkable development of their mesophyll tissue, consisting of a mass of lignified hair-like cells occupying about two thirds of the thickness of the lamina. This structure was not found in any of the other species of *Archeria*. Orr described this unusual feature and reproduced some photographs of transverse sections of leaves. He gave the name of the plant as "*Archeria comberi*" and attributed it to Summerhayes, thus publishing it in opposition to the latter's wishes.

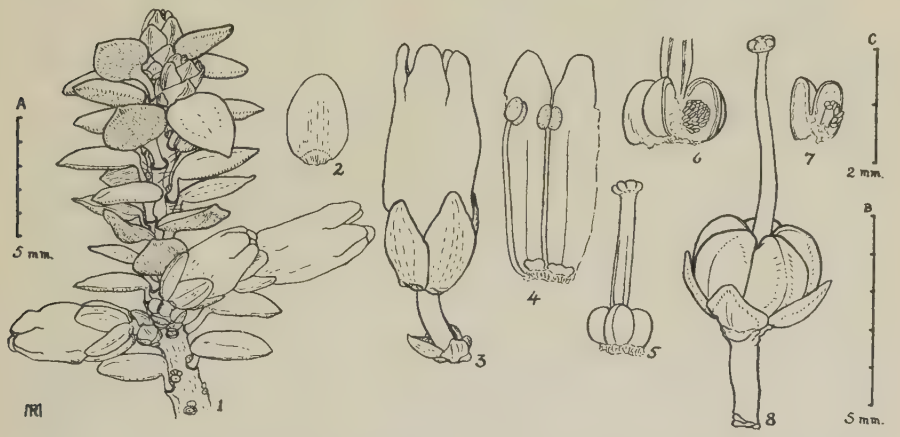


Fig. 1. *Archeria comberi* Melville. 1, Flowering shoot, scale A. 2, Sepal. 3, entire flower. 4, two petals with sessile stamens and part of disc. 5, ovary. 6, ovary with part of wall removed to show attachment of ovules. 7, portion of ovary wall from the inner side, showing a finger-like placentum attached at the lower inner angle of a loculus. 8, capsule. 2–5, 8—scale B; 6–7—scale C.

As Orr's account of the leaf anatomy is entirely in English, the name *Archeria comberi* has remained to this day a *nomen subnudum*. The taxonomy of the plant has been studied anew in order to remedy this state of affairs and at Mr. Summerhayes' suggestion the writer has taken sole authority for the combination. The species is named in honour of Mr. H. F. Comber, who during the years 1929 and 1930 made some excellent collections of Tasmanian plants which included several new species, of which this is one.

Archeria comberi *Melville*, sp. nov.; *A. serpyllifoliae* Hook. f. affinis a qua foliis latioribus et crassioribus, petiolis tenuioribus, sepalis ovatis ±

* Orr, M. Y., The Leaf anatomy of a new species of *Archeria* from Tasmania. Trans. Edin. Bot. Soc. **34,** 472–5 (1948).

eciliatis, lobis corollae brevioribus, glabrisque et stylis longioribus differt.

Frutex ericoideus, 15–60 cm. altus, ramulis sparse hispido-pilosis, foliis medianis ramulorum crassis late ovatis, apice acutis vel mucronatis, basi rotundatis vel truncatis, margine rotundatis vel acutis et serrulatis, petiolis tenuibus, 0·7–1·5 mm. longis. Flores solitarii in axillis foliorum ; pedicellis circa 2 mm. longis, basi perulis 5–7 ovatis persistentibus praeditis ; sepala 5, ovata vel elliptica, circa 2 mm. longa, 1·5 mm. lata ; corolla 5–7 mm. longa, 2 mm. lata, lobis 5 ovatis obtusis glabris ; stamina 5, sessilia ; ovarium 5-lobatum ; stylus tubo corollae aequilongus.

Tasmania : National Park, Tarn Shelf, near water and in moist well drained places, 4000 ft., H. F. Comber 1955 (Flowers), 31.12.1929 (Holotype, K.), H. F. Comber 2358 (fruit) 4.5.1930.

A small evergreen heath like much branched shrub 15–60 cm. high. Branchlets with scattered stiff hairs and persistent bud scales at the base of each year's growth. Leaves alternate crowded, glabrous, coriaceous and gibbous, not distichous, green or tinged with purplish red, paler green below ; lamina of median leaves of the yearly growth broadly ovate, 2–4 mm. long, 1·5–3·0 mm. broad, with acute to mucronate apex, rounded to truncate base and margin entire, rounded, or with an acute, serrulate, translucent border in the apical half ; basal and apical leaves of the yearly growth smaller, narrower and with base and apex ± acute ; petiole glabrous, 0·7–1·5 mm. long ascending close to the stem from a disc-like base, with the lamina spreading ± at right angles to it. Flowers solitary in the axils of the leaves, on pedicels about 2 mm. long, with 5–7 persistent ovate bud scales at the base, the uppermost about 1 mm. long ; sepals 5, ovate to elliptic, about 2 mm. long, 1·5 mm. broad ; corolla tubular 5–7 mm. long, 2·0 mm. diameter, pale pink, lobes 5, ovate, blunt, glabrous about $\frac{1}{3}$ as long as the corolla tube ; stamens 5, sessile at the mouth of the corolla tube, anther ellipsoid with a median groove and minutely bullate surface ; ovary 5 locular, distinctly 5-lobed, with a bluntly lobed disc at its base ; style as long as the corolla tube, deeply sunken in the ovary, stigma capitate, slightly lobed and flattened ; ovules numerous, attached to a finger-like placentum arising in the lower axial angle of each loculus. Fruit a five lobed capsule about 3 mm. diameter and 2 mm. high, with loculicidal dehiscence ; seeds small, ellipsoid, light brown.

SERRATULA IN CRETE.

W. B. Turrill

Serratula cichoracea is a Mediterranean species which was first described from the promontory of Mt. Argentario in south-western Tuscany. If one places *S. mucronata* Desf. Fl. Atl. **2,** 243, tab. 219 (1800) as a subspecies or variety of *S. cichoracea*, as is done by Fiori, Fl. Anal. d'Ital. **3,** 320 (1904) and Nuova Fl. Anal. d'Ital. **2,** 712 (1925–9) and apparently approved by Lacaita in Nuovo Giorn. Bot. Ital. **25,** 118 (1918), one accepts a fairly widely ranging species with a number of variants more or less clearly separated geographically. Dr. C. N. Goulimy adds to the known range and to the recorded variation by material collected by him in eastern Crete. The Cretan plant, judging from the specimens received, has the cauline leaves entire and decurrent. The wings are often conspicuous and up to 8 mm. wide. This character links our plant to the original *S. cichoracea* (*S. cichoracea* subsp. *cichoracea*) though the wings are more marked than in any Italian material seen, and separates it from *S. cichoracea* subsp. *mucronata* (Desf.). Distinctive for the Cretan plant are the short and mostly straight spines of the phyllaries which are broader than those of most other specimens of the species examined and are glabrous, apart from some papillae and marginal cilia.

Dr. Goulimy says the average height of the flowering stems is about 35 to 40 cm. In a second visit to the district he found that the *Serratula* extends in " a zone of one mile long commencing about 500 meters east of the village Tourloti and extending in the direction of the village Messa Mouliana." He had not time to determine the width of the zone. It is somewhat strange that, so far as can be ascertained, this conspicuous plant has not been previously recorded from Crete.

Serratula cichoracea (*L.*) *DC.* pp. subsp. **cretica** *Turrill* a *S. cichoracea* subsp. *cichoracea* phyllarium spinis 2·5–3 mm. longis praecipue distinguitur.

Herba perennis, glabra. *Caules* erecti, longitudinaliter costati. *Folia* basalia oblongo-oblanceolata, basi in petiolum 3 cm. longum angustata, lamina 11 cm. longa 3·5 cm. lata margine acute (fere spinoso-) dentata pagina utraque subprominente dense reticulata nervis lateralibus utrinque circiter 20; caulina superiora sessilia oblonga vel lanceolato-oblonga, acuta, apice breviter abrupte mucronata vel spinoso-apiculata, 4·5–9·5 cm. longa, 1·5–2·5 cm. lata, margine integra, saepe conspicue decurrentia, costa nervisque subprominentibus, inconspicue reticulata. *Capitula* 1–2, pedunculis 2–6 cm. longa suffulta, 3·5–5 cm. longa, 3–5 cm. diametro, homogama ; periclinium ovoideum vel late ovoideum, 2–2·5 cm. longum, 1·5–2·3 cm. diametro ; phyllares numerosi, compresso-imbricati, apice spinosi spina simplici erecta vel leviter patula vix recurvata terminati, plus minusve papillosi et apicem versus ciliati aliter glabri, intermedii oblongi, apicem versus angustati, 13 mm. longi (spina 2·5–3 mm. longa inclusa), 4·5 mm. lati, supremi lineares 2·5 cm. longi 2·5 mm. lati apicem versus angustati ; receptaculum dense setosum, setis 1 cm. longis. *Flosculi* numerosi, purpurascentes. *Pappi setae* multiseriatae, rigidule subpatulae, barbellatae, exteriores 1–2 mm.

longae, interiores 13 mm. longae. *Corollae* tubus 18 mm. longus, basi 1·25 mm. medio vix 0·5 mm. apice 1·5 mm. diametro ; lobi anguste lineares, apice leviter cucullati, 10 mm. longi, 0·6–0·75 mm. lati, longitudinaliter tenuiter binervosi. *Antherae* lineares, apice obtusae, basi sagittatae, 9 mm. longae ; filamenta 3 mm. longa. *Receptaculum* (ovarium) obliquum, leviter compressum, apice truncatum, 7 mm. longum, 2 mm. diametro, glabrum ; stylus 2·7 cm. longus, gracilis, glaber (8 mm. infra apicem papilloso-barbellatus exceptus) ; stigma bifidum, 1 mm. longum, segmentis erectis adpressis.

E. Crete : on stony ground on the slopes overlooking the road leading from the village Messa Mouliana to the village Tourloti, 14 June 1957, *C. N. Goulimy*. Holotypus in Herb. Kew.

Mushrooms, Russia and History.*—" There are already many scientific treatises on mycology—but none on the cultural implications of the fungus world in the history of our European ancestors ". This is a gap our authors set out to fill and their work has necessarily lain largely in the field of folk-lore and philology, a familiar hunting ground of illbalanced enthusiasts for generations. It is, therefore, important to dispel at the outset any idea that the Wassons are just another couple of crazy Yankees with bees in their bonnets. On the contrary one of them is of Russian birth, is that how she comes to write English so well ?, and while their enthusiasm is unconcealed their approach to their rather nebulous theme is cautious and well documented. It is encouraging, for example, to find them shrewd enough to reject the famous mushroom tree of Plaincourault, so long uncritically accepted by mycologists unfamiliar with the conventional representations of trees in Byzantine and Romanesque art.

Volume 1 sets out to explain why the English and their neighbours around the North sea, " a gigantic and evil fairy ring ", associate the Agaricales with toads and fear them whereas the northern slavonic peoples on the contrary are ardent mycophiles. A partial explanation is found in the differences in these peoples' relative degree of security in past ages. " A people who have always had an abundance of other foods are little tempted to brave the initial perils of the mushroom world . . . In the desperate exigencies of chronic war through decades and generations and centuries . . . men and women will discover the humble mushroom and will prove the various kinds by trial and error, and make friends among them in time of need ". It seems doubtful if food was always so abundant for the bulk of the population in mediaeval England but let that pass, the suggestion may account in part for slavonic addiction to mycophagy. What of the positive aversion to toadstools and

* Mushrooms, Russia and History, by V. P. and R. G. Wasson. Pantheon Books, New York, 1957. 2 vols. Pages xxi + 433, 82 plates, 30 in colour. $125.00.

the mysterious association of Agaric and toad in the languages of north-western Europe ? Here the authors have a fascinating and apparently plausible story to unfold. After discussing the meanings of the names applied to the common toad by European peoples they conclude the most significant to be the Breton " tousec ", derived from " toxicum " and hence meaning " the poisonous one ". Breton " kabell tousec " hence means " poison cap " as well as " toad's cap " and the significance of toad-names applied to poisonous fungi becomes clear. A further disquisition on the intimate association in the mediaeval mind between toad and devil leads to the conclusion that agarics and Boleti were the devil's bread, which accounts for the French " pain de crapault " for wild fungi and especially for the term " crapaudin " for *Amanita muscaria*, well known for its association with demoniacal possession. The association in the popular mind between Boleti and the Devil is supported by a detail in Hieronymus Bosch's painting, the Hay Wain. There follow chapters on the diabolical associations of puffballs, (" Puckfist "), and the erotic significance attached both to the larger *Fomes* and the Morels. It is assumed that μὐχης was originally the name of the morel and " that it's awesome religious and magical meaning, its link with the generation of fire and divine procreation, so far eclipsed all other fungal associations that it took over the whole semantic area of the fungi." Further suggestions regarding the relationships between eskimo and Finno-Ugrian words for mushroom and those of the Indo-european peoples are fascinating but too speculative to be quoted here.

The name " mushroom " itself, admittedly derived from an older form of " mousseron ", is held to be derivable from μὐχης and thus to signify a blob of mucus. " Cepe ", as applied to *Boletus edulis*, is thought to be cognate to the Spanish " seta ", which has been traced back to σὴπτα, rotten things. The name " morel " is thought to have a phallic origin and it is suggested that morels were the fungi intended by Ovid in his reference to the legendary origin of Corinth :

> . . . . hic aevo veteres mortalia primo
> corpora vulgarunt pluvialibus edita fungis.

Throughout the discussion the authors apparently accept as well established all modern guesswork regarding the nature of the " old religion " and it is difficult to follow some of their conclusions. What is " erotically suggestive " about *Hydnum imbricatum* ? (p. 177).

The final chapter of volume 1 deals in detail with the uses of *Amanita muscaria*, a fitting preparation for the study of Mexican hallucinogenic species in the second volume. The proffered explanation of the name " Fly Agaric " and its analogues in many European tongues appears, however, scarcely proved. It is also straining our credulity to ask us to believe that in the 17th century Otto Marseus van Schrieck composed his still life studies to convey a demonological message to posterity. In fact the moth on which so much stress is laid, as personifying a demon, is not particularly close to the *Amanita muscaria*. If it has this esoteric significance what is to be understood of the dragon fly almost in contact with the *Volvaria*, or is the dragon fly to be associated rather with the Coprini, which earlier in the book have been shown to be connected in the folk mind with dogs ? One begins to feel that the authors are able to

explain too much ! Oddly enough they apparently have not themselves experimented with *A. muscaria*, either as a fly killer or as a source of hallucinations. The record of their Mexican experiences shows that it was certainly no lack of courage or enterprise which prevented their doing so.

When the Spaniards arrived in Mexico they found inebriating mushrooms in widespread use among the Indians, from the Valley of Mexico southwards. These mushrooms produced hallucinations that the Indians thought were divinely inspired. Though scattered references to the fungi occur in 16th to 18th century writings the species concerned were not critically examined by Europeans until Dr. R. E. Schultes secured adequate specimens of some of them from Huautla de Jimenez, Oaxaca, in 1938. These were determined as *Panaeolus campanulatus* var. *sphinctrinus*.† Later evidence indicated that other species must also be involved and in 1955 the Wassons decided to visit Oaxaca and investigate the problem personally. In volume 2 we find a very detailed first hand account of the diverse rituals involved in mushroom consultation among the Mazatecs and Zapotecs and a second hand account of their use by the Mije, another tribe of Oaxaca, and even by the Nahua in the vicinity of Mexico city. Three of the species involved are figured in colour but one is left to seek elsewhere for technical descriptions. It is suggested that the presence of mushroom-shaped stones among Maya artefacts may indicate the former existence of a mushroom cult of the Maya, though no trace of survival of such a cult could be traced among the Guatemalan Indians today. Vivid descriptions are given of the hallucinations experienced by the authors after consumption of the sacred mushrooms, both in Oaxaca and in the very different environment of New York. Exciting as these are perhaps a more charming and useful social application of a basidiomycete is that recorded for *Trametes suaveolens* so long ago, by Linnaeus among the Lapps :

" Adolescentes hunc inventum sollicite servant in marsupio ante pubem pendulo, ut gratiorem odorem spirantes nymphis suis placeant". Civilisation is reaching out towards the Lapps today but let us trust the nymphs are still as easily pleased.

The book is lavishly illustrated with coloured plates of Agarics and Boleti from the brush of the well-known Provençal naturalist, J. H. Fabre. These have little scientific value, for they relate to common species, without microscopic details, but some are of great beauty. Others are not superior to other published figures and a few, notably the plate of *Amanita muscaria*, are distinctly inferior. There are also many excellent collotype reproductions of old European paintings which include toadstools, of early illustrated manuscripts, also of the Mexican mushroom rites and their participants.

It remains only to congratulate Mr. and Mrs. Wasson on their ingenious and original thesis so patiently and thoroughly elaborated and now so lovingly and lavishly laid before a sceptical and, alas, mycophobic world. One reveiwer, at least, has read these volumes with intense enjoyment and, let us hope, not without profit.

R. W. G. Dennis.

† Later investigation have cast doubt on the hallucinogenic properties of this species.

TWO SPECIES OF MARASMIUS DESCRIBED BY HENNINGS FROM SOUTH BRASIL.

R. W. G. Dennis

In *Taxon* **1,** 64 (1952) the writer appealed for information regarding the authentic material of those tropical fungi described by Hennings and lost with the Berlin herbarium during the last war. Recently, by the kindness of Prof. O. Fidalgo and Mrs. M. E. P. K. Fidalgo of the Botanic Garden, Rio de Janeiro, cotypes of several species described from Puttemans's collections in São Paulo have been made available to us. The opportunity is therefore taken of amplifying and amending the descriptions of two Brasilian Marasmii, for comparison with those figured in the author's earlier papers.

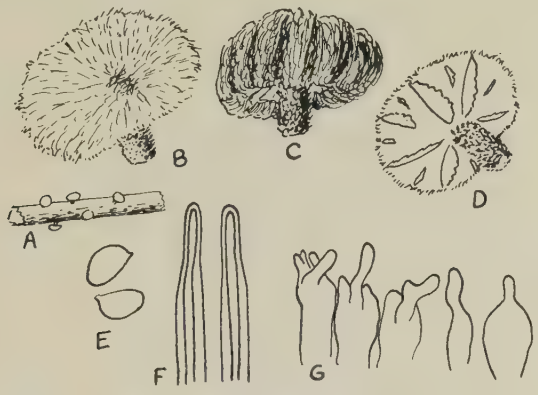


Fig. 1. *Crinipellis ochraceo-papillatus* (P. Henn.) Dennis.
A. Natural size. B–D. Pilei enlarged, B soaked up, C dry, D from beneath, showing the free distant lamellae. E. Spores. F. Tips of hairs from the pileus. G. Cheilocystidia. All microscopic details × 660.

Crinipellis ochraceo-papillatus (*P. Henn.*) *Dennis*, comb. nov.

Marasmius ochraceo-papillatus P. Henn. in Hedwigia **43,** 203 (1904).

Pileus about 2 mm. in diameter, convex, with a slight apical papilla, drying straw coloured, covered with long, silky, shining, more or less adpressed hairs ; stipe often excentric, up to 1 mm. long and 0·2 mm. thick, downy, light brown ; lamellae distant, unequal, ventricose, free, with toothed margins. Hairs of the pileus very long, 5μ thick, cylindrical, undulating, tapering slightly to a rounded tip, walls about 1·5–2μ thick, stained red-brown by Melzer's reagent and deep blue by cotton blue ; cheilocystidia abundant, forming a sterile edge to the lamella, 5–9μ diameter, usually crowned by from 1—4 finger-like processes ; basidia 30 × 9μ, 4-spored ; spores non-amyloid, short-ellipsoid, 9–11 × 5–6μ. Fig. 1.

On a slender woody stem, Serra da Cantereira, São Paulo, March 1903, *A. Puttemans* 805.

This is obviously very near to *Crinipellis bambusae* Pat. (1908), described from bamboo culms in São Paulo. It should also be compared with *Marasmius schiffneri* Bres. apud von Höhnel (1907), the description of which is quite inadequate but reads rather like that of a small *Crinipellis*.

Marasmius puttemansii *P. Henn.* in Hedwigia **43,** 203 (1904).

Pileus about 5 mm. across, convex with a slight central papilla, deeply radiately sulcate above the lamellae, very dark purplish-brown, pruinose under a lens ; stipe very slender and hair-like, up to 8 cm. long according to Hennings, dark brown, whitish at the tip only, smooth and shining ; lamellae distant, equal, broad, ventricose, adnexed without a collar, drying buff with a white margin. Pileus surface covered with cystides-en-brosse bearing numerous, short, obtuse, red-brown processes about 3 × 1μ ; cheilocystidia similar but hyaline, about 5–8μ across, forming a sterile edge to the lamella, pleurocystidia lacking ; trama of loosely woven hyphae stained brown by Melzer's reagent ; spores non-amyloid, tear-shaped, 7–9 × 2–3μ. Fig. 2.

On fallen leaves, associated with hair-like rhizomorphs, Serra da Cantereira, São Paulo, 21 March 1904, *A. Puttemans* 860.

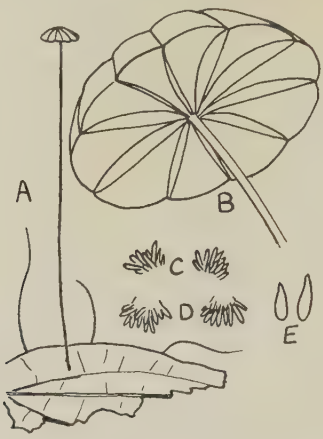


Fig. 2. *Marasmius puttemansii* P. Henn.
A. Natural size. B. Soaked up and enlarged. C. Cystides- en-brosse from the pileus surface. D. Cheilocystidia. E. Spores × 660.

There is a slight wrinkling of pileus hymenial surface between the lamellae but the latter do not anastomose as stated by Hennings and I see no trace of the peculiar " Zentrum mit einer scheibenformigen Vertiefung von gelber Farbung " around the apical papilla on which he laid stress. The two pilei examined are dark purplish brown throughout. The spores cited in the diagnosis, " subglobosis, hyalinis, 2·5–3μ ", were evidently mould conidia, normal basidiospores are plentiful on the lamellae. *Marasmius puttemansii* is obviously distinct from any species seen in Trinidad and figured by Dennis (1951a). In Singer's (1951) key it would run down to *M. rufo-marginatum* or to *M. atrorubens* (Berk.) Berk., according to the interpretation placed on the colour reaction of the trama with iodine. It is certainly not the same as the latter, which has a hairy stem and fusiform cheilocystidia, as figured by Dennis (1951b).

Dennis, R. W. G. 1951a. Trans. brit. mycol. Soc. 34, pp. 411–482.
Dennis, R. W. G. 1951b. Kew Bulletin 1951, pp. 153–163.
Singer, R. 1951. Lilloa 22.

NEW OR INTERESTING AUSTRALIAN DISCOMYCETES.

R. W. G. Dennis

The following are among a number of collections recently forwarded to Kew by Dr. C. G. Hansford, from the Waite Agricultural Research Institute, South Australia.

Boudiera areolata *Cooke & Phillips* var. **macrospora** *Dennis*, var. nov.

A typo ascosporis majoribus 45–50μ diam. distinguitur.

Apothecia pulvinate, sessile, black, 11 mm. diameter, flesh thin, soft, composed of large, thinwalled, globose cells ; asci cylindrical, 2–3-spored, thinwalled, about 400 × 50μ, paraphyses cylindrical, clavate, brown-walled throughout, coherent at the tips to form an epithecium, ascospores globose, 40–50μ diameter, hyaline, then light brown, ornamented with a reticulum 2–3μ high, having meshes 7–10μ wide. Amongst moss on sandy soil, Meningie, South Australia, leg. *L. D. Williams*, July 1956, W.A.R.I. 7512.

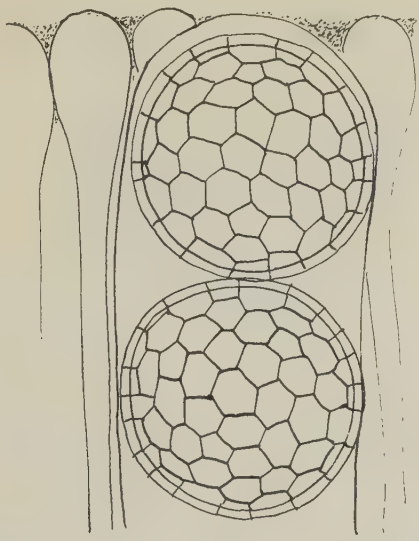


Fig. 1. Tips of ascus and paraphyses of *Boudiera areolata* var. *macrospora* × 660.

The fungus is closely allied to the type species of *Boudiera*, *B. areolata*, which in its typical variety has 8-spored asci with ascospores 25–30μ diameter. Spore measurements are taken in each case on the continuous globose wall, overall measurements to the tips of the reticulum will be about 5–6μ greater. Asci of the Australian material stain wine-red throughout with Melzer's reagent.

Helotium herbarum (*Pers. ex Fr.*) *Fr.* var. **eucalypti** Dennis, var. nov.

A typo colore obscuriore differt.

On dead *Eucalyptus* leaves, Coonalpyn, South Australia, lef. *L. D. Williams*, Sept. 1956, W.A.R.I. 7605.

This interesting collection is readily distinguished from European material of *H. herbarum* by the darker, more gray-brown colour of the receptacle and stalk, yet in habit, stature, and anatomy it resembles that species very closely. One would like to see more collections from Australia and to have a clear indication that it is confined to *Eucalyptus* leaves before proposing to allot it specific rank.

Apothecia scattered, erumpent from the dead leaves, disc pruinose, very pale buff, flat or slightly convex, up to 1 mm. across ; receptacle approximately snuff-brown (Ridgway), minutely pruinose, becoming paler at the margin ; stalk very short, cylindrical, concolorous. Excipulum composed of short rectangular cells, lying almost parallel with the surface, pruina composed of similar short cells forming the free tips of hyphae ; hyphae in the stalk parallel, thinwalled, short-celled, about 6μ wide, those of the hypothecium closely compacted ; asci cylindric-clavate, with short-conical tips, the pore not blued by Melzer's reagent, 65–75 × 6–7μ, 8-spored ; ascospores uniseriate, elliptic-cylindric to narrowly obovate, nonseptate, hyaline, 8–10 × 3μ ; paraphyses cylindrical, about 2μ wide, often inflated to about 3μ at the tip.

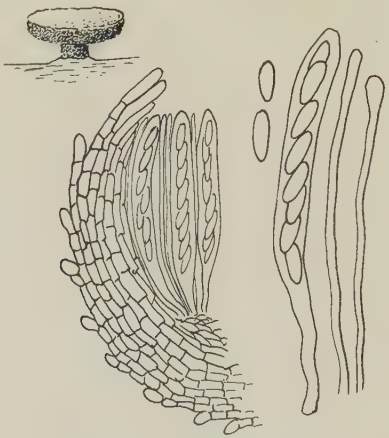


Fig. 2. *Helotium herbarum* var. *eucalypti*. Apothecium × 15, section of excipulum × 400, ascus and paraphyses × 660.

Encoelia toomansis (*Berk. & Br.*) *Dennis* comb. nov.

Tympanis toomansis Berk. & Br. in Trans. Linn. Soc. London, ser. 2, **2,** 222 (1887).

On old cones of *Banksia* sp., Meningie, South Australia, *L. D. Williams* 74, Sept. 1956, W.A.R.I. 7623. On *Banksia marginata* cones at 2500 ft., Mitchell Plateau, Grampians, leg. *R. Melville* 2014, 3.11.1952.

The type collection was from the banks of the Tooma river in southern New South Wales so it appears probable that this beautiful and distinctive species occurs plentifully on fallen *Banksia* cones throughout south-eastern Australia. In transferring it to *Encoelia* I am following the indication already given by Dr. J. W. Groves in his recent valuable monograph of *Tympanis* and kindly confirmed by him in correspondence.

Groves, J. W. (1952). The Genus Tympanis in Canadian Journal of Botany 30, pp. 571–651.

NEW BRITISH FUNGI.

R. W. G. Dennis

Sordaria ustorum *Mouton* in Bul. Soc. Roy. Bot. Belg. **36** (2), 11 (1897).

Perithecia scattered, pyriform, up to 400μ across, black, with the venter immersed in soil and the low, broad, ostiolar papilla protruding ; asci 8-spored, ascospores uniseriate, ellipsoidal, 17·5–20 (–22) × 11–13·5μ, at first hyaline, then ornamented with short dark lines, finally black and opaque with a very short, conical, hyaline appendage. Fig. 1.

On burnt ground, Keswick, Cumberland, *D. A. Reid*, 4.6.1956.

This is evidently closely akin to *S. carbonaria* (Phill. & Plowr.) Sacc., from which Mouton differentiated it " par l'ostiole moins épais et non sillonné, par la forme des spores plus épaisses ainsi que par la ponctuation apparente (?) de l'épispore, ponctuation qui me parait due à ce que le pigment colorant commence par se déposer par points." It seems even closer to *Sordaria vesticola* (Berk. & Br.) von Höhnel, which grew on old cloth and yields dark brown ascospores 16–19 × 10–13μ, with a rather narrower hyaline basal appendage.

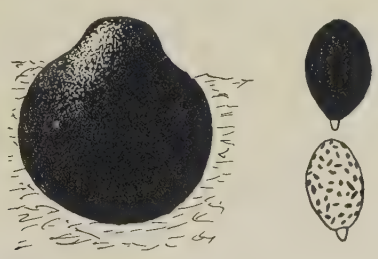


Fig. 1. *Sordaria ustorum.* Perithecium × 50, ascospores × 660.

Gnomonia tetraspora *Winter* in Hedwigia **11,** 148 (1872).

The British material bears abundant mature perithecia on the tips of the previous year's stems of *Euphorbia cyparissias*, the type host. Its 4-spored asci measure approximately 50 × 8μ, with uniseriate ascospores 11–15 × 4–5μ, not constricted at the septum.

Whitewell Bottom, near Kilcot, Gloucestershire, V.C. 34, leg. *N. Y. Sandwith* 4525, 15.5.1955.

Glomerella montana (*Sacc.*) *von Arx & Müller* in Beitrage zur Kryptogamenflora der Schweiz, **11** (1), 196 (1954).

Perithecia scattered or in small groups, immersed in the mesophyll and visible to the unaided eye as minute blackish dots, subglobose, about 200μ diameter, ostiole often surrounded by a rudimentary clypeus of dark brown hyphae within the host epidermis ; asci pinkish in the mass, up to 70 × 14μ, short-stalked, unitunicate, the apical ring blued by Melzer's reagent, 8-spored ; ascospores uniseriate to biseriate, elliptical, hyaline, 12–18 × 5–7μ ; paraphyses abundant, filiform.

In dead leaves of *Sesleria coerulea*, Aysgarth, Yorkshire, *W. G. Bramley*, 26.5.1946.

I am indebted to Dr. Emil Müller for confirming this determination.

Pleospora discors (*Dur. & Mont.*) *Ces. & de Not.* in Comm. Soc. Crittogamologica Italiana **1** (4), 218 (1863).

I have to thank Dr. E. Müller for the following determinations of what is evidently a common fungus on dead leaves of sedges and grasses :

On *Koeleria gracilis*, Harris, Isle of Rhum, Invernessshire, 21.7.1951 ;

On *Festuca* sp. Galmisdale, Isle of Eigg, Invernessshire, 29.7.1951 ;

On *Carex panicea*, Harris, Isle of Rhum, Invernessshire, 21.7.1951.

The ascospores of this species closely resemble those of *P. herbarum* (Pers.) Rabenh. in size (30–37 × 12–19μ), shape, septation and colour and I have previously listed the above collections under that name in Trans. Bot. Soc. Edinburgh 36, p. 63.

Trichophaea bicuspis (*Boud.*) *Boud.* Icon. mycol. Livraison 14, July 1907.

A collection of this rare species, distinguished by its peculiar hairs with a downward pointing appendage up to 350μ long, is to be found in the late C. Crossland's herbarium at Kew under the name " *Lachnea erinacea* (Schw.) Sacc." It was evidently collected on a Yorkshire Naturalist's foray :

On twigs in swamp, Royston, near Barnsley, 20.9.1897.

Anthracobia humillima *Malençon* in Bul. Soc. mycol. France **43,** 98 (1927).

The following description is drawn up from the British collections. Apothecia up to 2 mm. across, cupshaped, sessile, disc concave then flattened, dark gray-brown to almost black, fringed with paler downy hairs which are thinwalled, septate, up to 80 × 12μ and taper to a point ; hairs on the flanks of the apothecium are similar but dark brown and up to 150 × 7μ. Asci about 125 × 11μ, 8-spored, ascospores elliptical, 11–15 × 6·5–7μ, with two oil drops ; paraphyses slender, clavate, about 5μ thick at the tip.

On burnt ground, in a pine wood, Woburn Sands, Bedfordshire, *D. A. Reid*, 18.6.1954.

This minute species is so dark as to be very difficult to see against the blackened soil and charcoal on which it grows and may well be more common than at present appears.

Peziza atrovinosa *Cooke & Gerard* in Bull. Buffalo Acad. Sci. p. 288, 1875.

Apothecia 1 to 2 cm. diameter, shallow cupshaped, becoming flattened, sessile, disc dark brown to blackish, flesh relatively thick, yielding no coloured juice. Asci cylindrical, 260 × 11μ, 8-spored, blued by iodine ; ascospores uniseriate, elliptical, 13–14 × 7·5–8μ, containing two oil drops,

ornamented with a more or less continuous network of prominent ridges ; paraphyses cylindrical, 3μ thick above.

On sterilised soil casing a mushroom bed, Worthing, Sussex, 5.5.1955.

The apothecia of the British collection are considerably smaller than those of the type from North America but the ascospores are very distinctive. Madame Le Gal has kindly examined the Worthing material and confirmed the determination.

Colpoma juniperi (*Karst.*) *Dennis*, comb. nov.

Coccomyces juniperi Karst. Mycologia fennica **1,** 254 (1871).

Clithris juniperi (Karst.) Rehm in Rabenhorst's Kryptogamen Flora Ed. 2, **1** (3), 102 (1888).

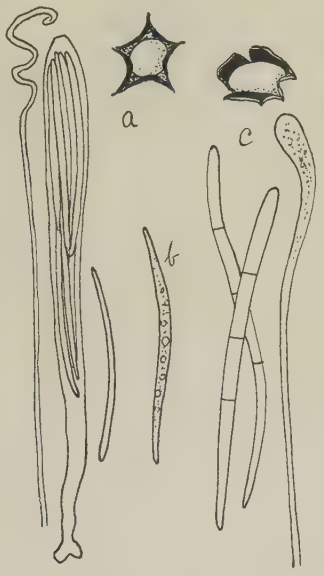


Fig. 2. *Colpoma juniperi* and *Coccophacidium pini*. (a) *C. juniperi*, habit sketch slightly enlarged, ascus, paraphysis and ascospore × 660. (b) ascospore of *C. juniperinum* Cke. & Peck × 660. (c) *C. pini*, habit sketch slightly enlarged, ascospores and paraphysis × 660, from *Pinus silvestris*, Loch Garten.

Colpoma juniperinum Rehm in 26th Ber. Naturhist. Ver. Augsburg 69 (1881).

Phacidium juniperi Karst. in Not. Sallsk. Fauna Flora Fenn. **11,** 257 (1870) nomen nudum.

On bark of *Juniperus communis*, Inschriach forest, north of Feshiebridge, Invernessshire, *R. W. G. Dennis & E. A. Ellis*, 21.7.1957.

This fungus closely resembles the common *Coccophacidium pini* (Fr.) Rehm in having a usually circular pale yellowish disc exposed by splitting of the bark into from 3 to 6 triangular flaps which are pushed open in wet weather. It differs from *C. pini*, common on *Pinus sylvestris* in the same neighbourhood, in its much smaller nonseptate ascospores and in having the slender paraphyses with spirally coiled tips characteristic of *Colpoma*.

Fig. 2. Terrier (1942) was evidently justified in citing the different shape of the paraphyses as an essential character separating *Therrya* Sacc. (= *Coccophacidium* Rehm) from *Colpoma*. *Colpoma juniperinum* Cooke & Peck in Bull. Buffalo Soc. Nat. Sci. 3, p. 36, 1875, on *Juniperus virginiana* in North America, is usually cited as a synonym of the present species. The type collection at Kew yields ascospores 45–50 × 2·5μ, considerably larger than those quoted by Karsten and found in the Scottish collection, viz. 35–40 × 1μ. Rehm, however, found them up to 50 × 2μ in a collection on *Juniperus nana* in the Tyrol.

Colpoma crispa (Pers. ex Fr.) Sacc., on other conifers, seems to differ largely in its more elongated ascocarps.

Fig. 3. *Seynesiella juniperi*, thyriothecia on Juniper needle × 10, single thyriothecium × 100, asci, ascospore, pseudoparaphyses and marginal cells × 660.

Seynesiella juniperi (*Desm.*) *Arnaud* in An. École nationale d'Agriculture de Montpelier, n.s. **16,** 203 (1918).

Dothidea juniperi Desm. in Ann. Sci. Nat. Bot. ser. 2, **15,** 141 (1841).

Microthyrium juniperi (Desm.) Sacc. in Michelia **1,** 351 (1878).

Stigmatea juniperi (Desm.) Winter in Rabenhorst's Kryptogamen Flora ed. 2, **1** (2) 340 (1885).

Seynesia juniperi (Desm.) von Höhnel in Ann. Mycol. **15,** 373 (1917).

Stigmatea alpina Speg. in von Thuemen, Mycotheca Universalis No. 1057 (1878).

On dead needles of *Juniperus communis*, Abernethy forest, Strathspey, Invernessshire, *R. W. G. Dennis & E. A. Ellis*, 21.7.1957.

The broadly conical thyriothecia of this, the type species of *Seynesiella*, measure about 200–250μ across and are more shining, black and opaque than in typical species of *Microthyrium* ; presumably that is why Desmazières referred them to *Dothidea* though he was proposing the genus *Microthyrium* for another species in the same paper. Under a lens they

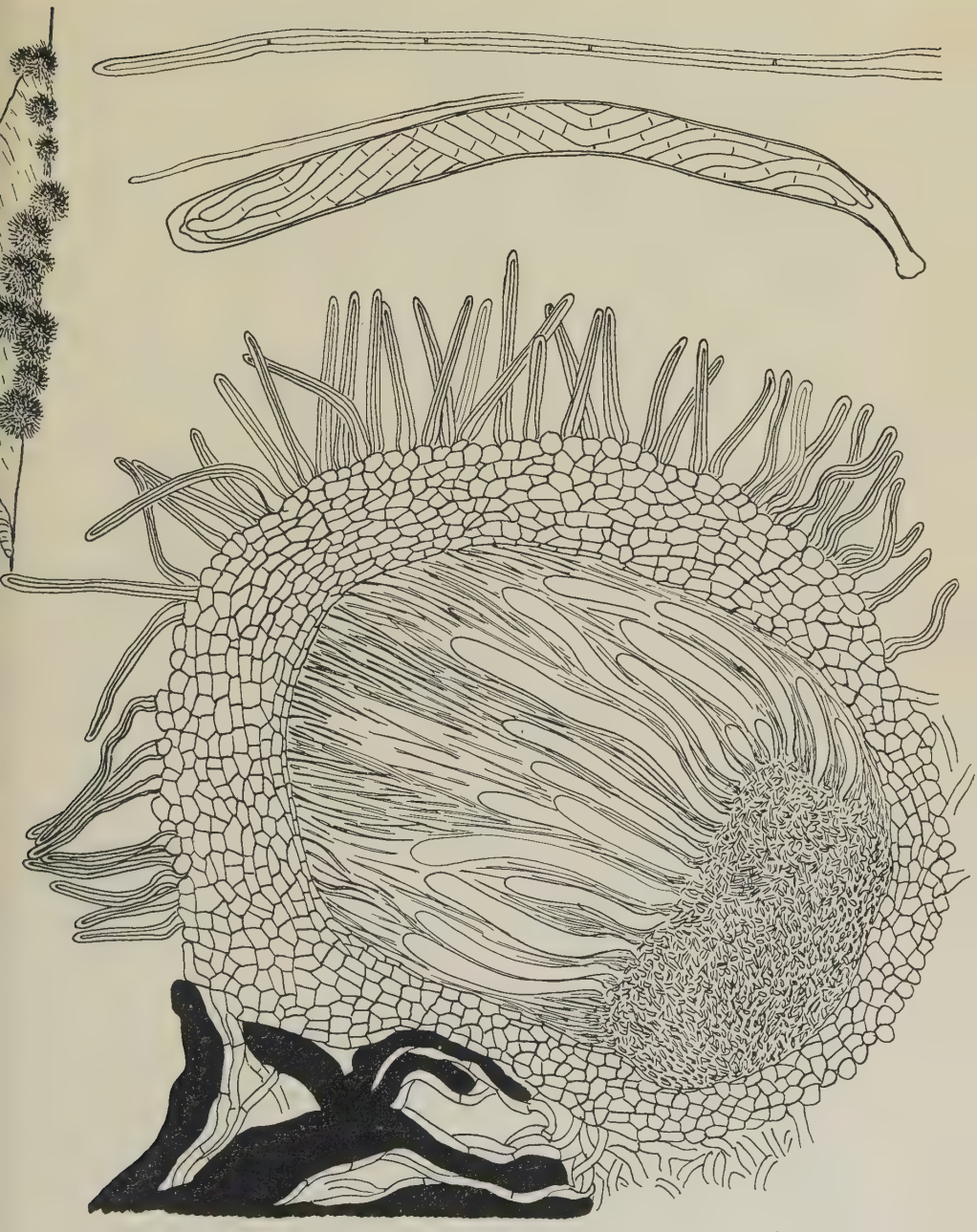


FIG. 4. *Podonectria tenuispora.* Habit sketch × 20, section of young pseudothecium × 500, ascus, pseudoparaphysis and hair × 660.

do recall ascocarps of a *Stigmatea*. The bitunicate 8-spored asci measure 50–60 × 15–20μ and are surrounded by numerous, filiform, branched pseudoparaphyses. The ascospores measure 15–20 × 4·5–6μ and remain for a long time hyaline, one-septate, with a large oil drop in each cell, but ultimately they become brown. There is a very sparse brown superficial mycelium with septate hyphae 3–4μ wide. Fig. 3.

A British Species of Podonectria

The genus *Podonectria* was founded by Petch (1921) to accommodate three fungi found attacking scale insects in the tropics viz. : *P. coccicola* (Ell. & Ev.) Petch, *P. auranti* (von Höhnel) Petch and *P. echinata* Petch. The first named has smooth brown pseudothecia, the others white or yellowish pseudothecia clothed with white hairs.

A fungus recently collected on Mussel Scale on heather in west Inverness-shire bears a close resemblance to *P. aurantii*, from which it seems to be separable by its narrower longer ascospores in much narrower asci.

Podonectria tenuispora *Dennis*, spec. nov.

Mycelium superficiale ex hyphis septatus hyalinis 3–4μ crassis compositum ; pseudothecia in mycelio superficialia plus minus dense gregaria, subglobosa, circa 250μ lata, pallide carnea, in sicco pallide ochracea, ostiolata, parenchymatice contexta, hirsuta ; setae hyalinae, septatae, usque 200 × 3·5μ ; asci, teretes, brevissime stipitati, bitunicati, 155–165 × 11–12 μ, ad apicem obtusi, incrassati, octospori ; ascosporae fasciculatae, vermiformes, spiraliter laxique dispositae, multiseptatae, hyalinae, 3–4μ crassae ; pseudoparaphyses filiformes, 1μ crassae.

In scutulis *Lepidosaphidis ulmi* (L.) ad ramos *Callunae vulgaris*, Camas na Togalach, Loch Morar, 13.7.1957. Fig. 4.

Pseudothecia are abundant in the type collection but none of those examined is perfectly mature. Hence free ascospores have not been available for measurement and it is difficult to assess accurately the length of spirally coiled ascospores within the ascus, or to count the number of septa. The ascospores appear, however, to be about 140μ long, almost twice the length of those in *P. aurantii*, with septa at intervals of 8–12μ. The setose ascostromata with bitunicate asci and spirally coiled ascospores bear considerable resemblance to those of *Acanthophiobolus* Berlese, from which they differ in their light colour. Conidial sporodochia have not been observed on the Inverness-shire material.

I am indebted to Mr. E. A. Ellis for determining the scale and to Miss J. Dingley for advice on the systematic position of the fungus.

Ramularia ruta-murariae *Trotter* in Sylloge Fungorum **25,** 731 (1931).

Minute white tufts of mould on the upper surface of dead patches in fronds of *Asplenium ruta-muraria* ; conidia cylindrical, hyaline, with a prominent basal scar or in short chains and with a scar at each end, 8–14 × 2–3μ.

Balaam's Lane, Thornbury, Gloucestershire, 11.11.1947.

Petch, T. (1921). In Trans. Brit. mycol. Soc. 7, pp. 143–167.
Terrier, C. A. (1942). Matériaux pour la Flore Cryptogamique Suisse 9, Fasc. 2, p. 63.

NOTES ON AFRICAN ROSACEAE : II.

R. A. Graham

(1) *A new species of Rubus from Ethiopia.*

Rubus aethiopicus *R. Grah.*, sp. nov. elegans *R. volkensii* Engl. aliquantum similis sed caulibus pruinosis, praeter inflorescentiam eglandulosis, et foliis subtus albotomentosis valde distincta.

Frutex erectus vel herba fruticosa ad 2·25 m. altus non scandens. Caules turionum pruinosi glabri eglandulosi purpureo-virides minute sulcati teretes 6–9 mm. crassi ; illi ramorum floriferorum similes sed minus crassi et apud inflorescentiam aculeis parvis 2–5 mm. longis, saepe angustis, acutissimis, decurvatis vel rigido-deflexis, basi variabiliter inflatis, et glandibus stipitatis ad c. 1 mm. longis supra ± densis armati. Folia imparipinnata (2-jugata tantum visa) vel illa ramorum floriferorum nonnihil trifoliolata ; foliola terminalia turionum ovata vel ovato-elliptica vel elliptica, c. 9–11 × 5·5–6·5 cm., lateralia inferiora magnitudine foliolum terminale ± aequantia, superiora ± aequantia vel paululum minora ; omnia foliola apice acute acuminata, basi angustata vel truncata vel subcordata ; margines acutissime serrata vel biserrata dentibus 1–3 mm. altis ; supra viridia glabra vel pilis brevibus dispersis leviter hirsuta, subtus albotomentosa nervis (lateralibus excurrentibus) costaque prominentibus flavo-brunneis ; foliola ramorum floriferorum omnino similia sed minora ; foliola omnia lateralia sessilia. Stipulae 10–11 mm. longae, anguste lanceolatae, basem versus rachidi per c. 5 mm. connatae. Inflorescentia terminalis et axillaris, ± breviter racemosa. Flores ut videtur nutantes. Pedicelli breves, 5–10 mm. longi, ± dense stipitato-glandulosi. Calyx 1·3–1·5 mm. longus, profunde fissus, basi glandibus stipitatis aculeolisque obtectus. Sepala 1·0–1·3 cm. longa, lanceolata vel ovato-lanceolata, apice cauda c. 3 mm. longa ornata, erecta amplectantia, tomentosa vel extra basem versus glabrescentia subcarnosa brunneo-purpurascentia. Petala cremea, 9–10 mm. longa × 8–8·5 mm. lata, subrotunda sed basi abrupte angustata, apice emarginata. Filamenta 1·75–3 mm. longa glabra, ? sucini colore. Antherae 0·8–0·9 mm. longae, ± reniformes. Styli c. 4 mm. longi, supra glabri, infra albo-pilosi. Carpella juvenalia ut videtur purpureo-nigra, pilis albis dispersis munita.

Ethiopia. Dekano, small clearing in dense thorny jungle in valley bottom close to swamp, 2610 m., *Mooney* 6177 (K, holo. !) ; Amaro Mts., eastern slopes of Mt. Delo, bamboo, etc., forest near stream, 2910 m., *Gillett* 15026 (K !).

The two records given above are apparently the only ones so far known for this attractive, raspberry-like *Rubus*. In *Gillett* 15026 the imparipinnate development of the leaves is at a less advanced stage, but by contrast the fruits are far more mature, the carpels being 2·5 mm. long, greenish-brown, pilose at the apex with or without scattered pile elsewhere on the testa ; and the turion stems—apparently unarmed in the holotype—are in Gillett's gathering provided with fairly stout prickles 4–5 mm. long.

(2) *New Status in Rubus.*

1. **Rubus steudneri** *Schweinf.* var. **dictyophyllus** (*Oliv.*) *R. Grah.* Type : Kilimanjaro, *Johnston s.n.* (K, holo. !).

Syn. *R. dictyophyllus* Oliv. in Trans. Linn. Soc. Bot. Ser. 2, 2 : 332 (1887). Type as above.

R. keniicola Focke in Ann. Conserv. et Jard. Bot. Genéve, 20 : 103 (1917). Type : Mt. Kenya, *Skene* 115 (G, holo.)

R. rooseveltii Standl. in Smithson. Misc. Coll. 68, 5 : 4 (1917). Type : Mt. Kenya, *Mearns* 2371 (US, holo. !).

2. **R. friesiorum** *C. E. Gust.* ssp. **elgonensis** (*C. E. Gust.*) *R. Grah.* Type : Uganda, Mt. Elgon, *Dummer* 3541 (K, holo. !).

Syn. *R. friesiorum* C. E. Gust. var. *elgonensis* C. E. Gust. in K.B. 1938 : 178 (1938). Type as above.

3. **R. pinnatus** *Willd.* var. **subglandulosus** (*C. E. Gust.*) *R. Grah.* Type : Kenya, Mt. Elgon, *Lugard* 509 (K, holo. !).

Syn. *R. pinnatus* Willd. forma *subglandulosus* C. E. Gust. in K.B. 1938 : 183 (1938). Type as above.

(3) *New Status in Alchemilla.*

Alchemilla ellenbeckii *Engl.*, Jahrb. 46 : 135 (1911). Type : Ethiopia, *Ellenbeck* 1784.

ssp. 1. **ellenbeckii**

Syn. *A. mildbraedii* Engl. in Mildbr., Wiss. Erg. Deutsch. Zentr.-Afr. Exp. 1907–8, 2 : 226 (1911). Type : Ruanda Urundi, *Mildbraed* 973 (B).

ssp. 2. **nyikensis** (*De Wild.*) *R. Grah.* Type : Nyasaland, *Henderson* s.n. (BM, holo. !).

Syn. *A. nyikensis* De Wild. in Bull. Jard. Bot. Brux. 7 : 376 (1921). Type as for ssp.

A. mildbraedii Engl. var. *iringae* Haum. & Balle, spec. in Kew herbarium (*nom. nud.*).

Note. Both *A. mildbraedii* and *A. ellenbeckii* were published in 1911. The latter is the earlier name, appearing as *nomen nudum* in Sitz. Preuss. Akad. Wiss. pt. 40 : 744 (1906), but it is certain from the Jahrbuch, l.c., that the description of *A. mildbraedii* was framed before that of *A. ellenbeckii* although perhaps, due to circumstances, not published—as evidence mildly suggests—until after that of the latter. Dr. Hedberg has examined the matter closely, and I follow him in giving priority to the latter name as a temporary expedient.

(4) *New Combinations in Magnistipula.*

Magnistipula butayei *De Wild.* var. **greenwayii** (*Brenan*) *R. Grah.* Type : Tanganyika, E. Usambara Mts., Amani, *Greenway* 6161 (K, holo.! ; OXF, iso. !).

Syn. *Hirtella sapinii* (De Wild.) A. Chev. var. *greenwayii* Brenan in Tropical Woods, 86 : 4 (1946). Type as above.

H.H. butayei (De Wild.) Brenan var. *greenwayii* (Brenan) Hauman in Bull. Jard. Bot. Brux. 21 : 179 (1951). Type as above.

Magnistipula eglandulosa (*Greenway*) *R. Grah., comb. nov.*

Type : N. Rhodesia, Barotseland, Sefula, *Borle* 254 (K, holo. ! ; OXF. iso.).

Syn. *Hirtella eglandulosa* Greenway in K.B. 1928 : 199 (1928). Type as above.

Climbing and Trailing Plants for the Garden.*—Apart from a few annual and herbaceous plants included in a chapter on " Climbers in Pots or Tubs ", this wholly practical handbook, which is intended primarily for the amateur gardener, deals with woody or semi-woody plants hardy in Britain, though some will thrive only in the milder districts. Climbers and scramblers can be grown on supports of various kinds, but their chief value in most gardens is for covering walls and fences, and since many shrubs can be trained to grow against such surfaces they are, quite rightly, included in this book. Trailing plants generally find a place in the garden to cover some awkward piece of ground, to hang down over rocks or low walls, or to clothe the ground beneath trees and in other more or less shady places ; a like service can be obtained from low-growing shrubs which form mats or carpets and from those of prostrate habit, and these too are included in the book. The scope of the volume is thus much wider than its title indicates, and it actually includes no fewer than 118 genera, descriptive notes of which, in alphabetical order, occupy pp. 67–134. But before this part of the book is reached Mr. Pearce has given guidance on the value of "climbing" and "trailing" plants, on the preparation of site and soil, on purchasing plants, planting, methods of support, " after-care " (a convenient term, even if it does smack of medical treatment), pruning, thinning, and propagation. For good measure the author deals also with the growing of climbers in pots and tubs, provides lists of " climbers " for various purposes, and a list of trailing plants and prostrate shrubs. The final pages are occupied by two indexes, a general one and one of " Popular and Catalogue Names ".

The information and advice is conveyed in a concise straightforward manner and is elucidated by the line-drawings, while the photographs show a selection of the plants themselves. Seven or eight of the plant-names are not, shall we say, up-to-date. Nevertheless a useful and reliable book.

J. R. Sealy

* S. A. Pearce, Climbing and Trailing Plants, 142 pp., coloured frontispiece, 29 photographs, and 14 line illustrations. W. H. & L. Collingridge Ltd., London, and Transatlantic Arts Inc., New York. 1957. Demy 8vo. 25/-.

Two interesting Scottish rusts.

E. A. Ellis

Jörstad, in *Nytt Mag. Bot.* **1**, 104 (1952) recorded the occurrence of the chiefly arctic rust *Puccinia eutremae* Lindr. (syn. *P. cochleariae* Lindr.) on a specimen of *Cochlearia alpina* Wats. collected at Cross Fell, Cumberland, by G. Samuelsson in June, 1909 and preserved in the State Museum of Natural History in Stockholm. No further evidence of the presence of this rust in Britain was obtained until 15 July, 1957, when teleuto-sori were found on *Cochlearia danica* L. growing near sea level on the shore of Loch Carron at Plockton, Wester Ross, Scotland. In these specimens the sori were epiphyllous, about 0·5-1·0 mm. in diameter, sparsely scattered on the leaves, at first covered by silvery epidermis, then pulverulent, dark brown. The teleutospores were with a very few exceptions two-celled, somewhat variable in shape, strongly constricted at the septum, dark reddish brown, smooth, 34–50 × 13–17 μ, with walls c. 1·5μ thick and apical thickenings of the distal cells 3–6μ ; pedicels hyaline, up to 50μ long, c. 4μ thick at the point of attachment to the spore, sharply attenuated below, deciduous (a short portion usually breaking away with the liberated spore). Only two plants out of some hundreds examined were found infected with the rust. No discoloration of the leaf tissues surrounding the sori was seen. Jörstad (1952) observed that although the teleutospores of *P. eutremae* were usually striate (often faintly so), those of the Cumberland specimen and some Spitzbergen material on *Cochlearia* were apparently smooth, as is the case with the Scottish examples.

The rust *Puccinia pazschkei* Diet. has been known to occur in Britain hitherto only as an introduced species on cultivated saxifrages ; but in July, 1957, indigenous *Saxifraga aizoides* L. growing at Inchnadamph and at the mouth of the river Naver west of Bettyhill, Sutherland, Scotland, was found to be parasitised by *P. pazschkei* var. *jueliana* (Diet.) Savile. The teleuto-sori occurred on yellow spots on the leaves and were mostly epiphyllous, up to 2 mm. broad, scattered or in small groups, margined by torn epidermis, pulverulent and very dark brown (appearing black to the naked eye). I. Jörstad, in Nytt Mag. Nat. 70, 378–383 (1932) gives an account of this rust on *S. aizoides* in Europe and states that the blackish sori are distinctive. The teleutospores were nearly all two-celled, slightly constricted at the septum and usually with an apical papilla rarely exceeding 3 mm. in thickness, dark reddish brown, finely verrucose and sometimes with faint striae (seen only on nearly dry spores), 32–60 × 14–24μ ; pedicels short, hyaline, deciduous. Dr. Jörstad has been kind enough to confirm the identification of the Scottish material.

Specimens of the two rusts described above have been deposited in the herbarium of the Royal Botanic Gardens, Kew.

NOMENCLATURAL NOTES.*—III.

A. A. Bullock

Galbulimima *versus* Himantandra

In Journ. Arnold Arb. 23 : 366–368 (1942), A. C. Smith gave a history of the generic names *Himantandra* F. Mueller and *Galbulimima* F. M. Bailey. The former was first mentioned as a *nomen provisorium* in 1887 when Mueller suggested that if his new species *Eupomatia belgraveana* should represent a new genus, a suitable name for it would be *Himantandra*. In 1890 Mueller definitely accepted the fact that *Eupomatia belgraveana* represented a distinct genus, and made the combination *Himantandra belgraveana*. A. C. Smith regarded the reference back to the description of *Eupomatia belgraveana* as sufficient to validate publication of the generic name, but although the genus was then monotypic the species was not, in 1890, nomenclaturally new and validation of publication by *generico-specifico* description demands that both the genus and the species shall be new (Art. 41).

It is clear, therefore, that *Himantandra* was not validly published before the appearance of *Galbulimima* F. M. Bailey (1894) and the latter name must take the place of *Himantandra*.

This conclusion was reached by Sprague (Journ. Bot. 60 : 138) in 1922 and reiterated by him (*loc. cit.* 61 : 200) in 1923. There does not appear to be any need to conserve the generic name *Himantandra*, but it will persist in the family name *Himantandraceae* which was validly published by Diels in 1917 and remains the correct family name under Art. 18.

An objection to the proposal to conserve *Himantandra* (Bucheim et A. C. Smith, Taxon 5 : 198. 1956) is that of the " great number " of works in which *Himantandra* is alleged to have been used, only one is cited. The title of the paper concerned includes the family name, so that the resuscitation of the correct generic name would not be a great inconvenience. Bucheim and Smith admit the fact that all the necessary combinations under the correct name have been made and they admit also A. C. Smith's error of 1942 in regard to the date of valid publication of the name *Himantandra*. Further, there is no long tradition of usage such as I pleaded in defence of my own proposal to conserve the generic name *Heteropyxis* Harvey (Taxon, 6 : 58. 1957).

Tremandraceae

The generic name *Tremandra* was first published as a *nomen nudum* by Robert Brown in his general remarks on the plants of Flinders' voyage to Australia (Flinders Voy. Terra Austr. 2 : 544. 1814) when he described the family *Tremandraceae* (as *Tremandreae*). The family also included the genus *Tetratheca* J. E. Smith but Brown disliked the name *Tetrathecaceae* because it gave a wrong impression of the anther structure in both *Tetratheca* and in his as yet unpublished *Tremandra*.

Under Art. 18 of the International Code (Paris, 1954), a family name must be formed from the stem of the name of its type genus, and although

* Continued from Kew Bull. 1957 : 356. 1957.

such names may or may not be legitimate they must be validly published (Art. 6). It follows then that although the family name *Tremandraceae* R. Brown is validly published, it is illegitimate. Further, the type genus of the family name must be *Tetratheca* since that was the only genus with a validly published name included in it.

Conservation of *Tremandraceae* from the next appearance of the name in DC. Prodr. 1 : 343 (1824), when the generic name *Tremandra* was also (p. 344) validly published, seems to be the easiest way to get over this difficulty and would also appear to satisfy Robert Brown's intention. The synonymy is as follows :—

Tremandraceae *DC.* Prodr. 1 : 343. 1824 (*Tremandreae*), nomen conservandum propositum. *Typus* :—*Tremandra* R. Br. ex DC. *l.c.* 344.

Tremandreae R. Br. in Flinders Voy. Terra Austr. 2 : 544. 1814, nomen (illegitimum) rejiciendum propositum. *Typus* :—*Tetratheca* J. E. Smith Bot. Nov. Holl. 1 : *t. 2.* 1793.

Rhodolaenaceae, *nom. nov.*

During the early years of the nineteenth century Thouars validly published the family name *Chlaenaceae* for a group of genera confined to the Mascarene Islands. He particularly described and figured the genus *Rhodolaena**, which is therefore an obvious choice for the lectotype genus.

There is no genus named *Chlaena*, *Chlaenus* or *Chlaenum* and the family name *Chlaenaceae* is illegitimate. I propose its replacement as follows :—

Rhodolaenaceae, *nom. nov.*

Chlaenaceae Thouars Hist. Vég. Iles Austr.-Afr. 46 (1807), *nom. illeg.*
Rhodolaena *Thouars, gen. typ. nom. fam.*

* This and other generic names in the family ending with " *-laena* " were " corrected " to " *-chlaena* " by Sprengel and others, but there is no doubt that Thouars' spelling was deliberate, even if etymologically less correct, and must be retained.—A.A.B.

A New Species of Amazonia.

C. G. Hansford

Amazonia novae-caledoniae *Hans.*, spec. nov. (3101.5240).

Plagulae hypophyllae, rotundatae, densae, usque ad 5 mm. diam. Hyphae atrobrunneae, rectiusculae, dense radiantes, subsolidae et pelliculam formantes, cellulis plerumque 15–25 × 6–8μ. Hyphopodia capitata alternata, antrorsa, recta vel curvula, 18–23μ longa ; cellula basali cuneata, 5–6μ longa ; cellula apicali ovata, integra, 13–17 × 6–8μ. Hyphopodia mucronata non visa. Setae nullae. Perithecia dispersa, depressoglobosa, sub pelliculam mycelii efformata, usque ad 400μ diam. et circa 100μ alt., superne stellatim dehiscentia. Sporae atrobrunneae, oblongae, obtusae, curvulae, 47–56 × 13–15μ, 4-septatae, leviter constrictae.

Hab. in foliis *Schefflerae vieillardii*, New Caledonia, *McKee* 5174 *p.p.* in Herb. Kew.

NOTES ON ASIATIC GRASSES : XXVIII.

New Species from the Himalaya

N. L. Bor

The following five new species were found in a really magnificent collection of grasses from Nepal, amounting in all to about one thousand numbers, put together by Messrs. Polunin, Stainton, Sykes & Williams, during several expeditions carried out during the past ten years. The types of the new species are in the herbarium of the British Museum (Natural History) ; isotypes are in the Kew Herbarium. I am much obliged to Mr. J. E. Dandy, Keeper of Botany, for making this material available for study.

Deyeuxia nepalensis *Bor*, sp. nov. cum *D. kashmeriana* Bor comparanda sed ab ea spiculis minoribus, glaucis, panicula laxa ramis inferne nudis, arista lemmatis infra apicem haud basi instructa satis recedit.

Gramen perenne, rhizomatosum. *Culmi* usque 60 cm. alti, teretes, laeves glabrique, nodis glabri. *Foliorum laminae* inferiores usque 5 mm. latae, 25 cm. longae, filiformes, lineares, plerumque complicatae, utrimque glabrae, scabrae vel laeves, marginibus scaberulae ; superiores redactae ; *vaginae* culmos complectentes, striatae, glabrae ; basales laxae, a culmis demum solutae ; *ligulae* breves, membranaceae, circa 2·5 mm. longae vel breviores, in apicem obtusum attentuatae.

Panicula usque 18 cm. longa, 13 cm. lata ; rami usque 8 cm. longi, 3–7-nati, media parte inferiore nudi, ramosi, laeves, glabri, inferiores bractea caduca saepe suffulti. Spiculae elliptico-acuminatae, 3·5–4·5 (5) mm. longae, purpureo-glaucae, anthesi hiantes. Gluma inferior explanata, elliptico-acuta vel -acuminata, 3·5–4·5 (5) mm. longa, apicem versus carinata, apici compressa, carina dorsoque scabra, purpureo-glauca ; *gluma superior* simillima. *Anthoecium* ♀, calli pilis lemmati aequilongis vel paulo brevioribus ; *lemma* 2·5–2·75 mm. longum, elliptico-oblongum, hyalinum, dorso scaberulum, 5-nerve, nervo medio in aristam infra apicem producto ; *palea* elliptico-obtusa, 2-nervis, bicarinata, hyalina, laevis glabraque ; *stamina* 3 ; *antherae* 2 mm. longae, purpureae ; *styli* 2 ; *stigmata* plumosa.

Nepal : Lulo Khola, 18 Sept. 1952, 15,000 ft., *Polunin, Sykes et Williams* 3468 ; South of Gurjakhani, 17 Aug. 1954, 11,500 ft., *Stainton, Sykes et Williams* 3889 (type)—amongs and and stones beside stream; Dogardi Khola, 28 Sept., 1954, 12,500 ft., idem 4638—sheltered bank near river ; S.W. of Gurjakhani, 19 Oct., 1954, 11,500 ft., idem 9088 ; beneath cliff.

This species, together with *D. kashmiriana* are the only two Indian species with callus hairs as long as or almost as long as the lemma, but the lemma in *D. nepalensis* is awned above the middle and not at the base, the long branches are bare in the lower half and the inflorescence is more or less glaucous. It is a somewhat variable species, particularly in the size of the spikelet, but quite distinct.

Eulalia staintonii *Bor*, sp. nov. cum *E. molle* (Griseb.) O. Ktze. comparanda sed ab ea racemorum pilis aureis haud roseo-albis, lemmatis superioris arista longiore (c. 21 mm. longa), gluma superiore longe aristata satis recedit.

Gramen perenne radicibus fibrosis. *Culmi* usque 50 cm. alti, teretes, striati, infra inflorescentiam nodosque sericeo-pilosi, nodis glabri. *Foliorum laminae* lineares, apicem basinque versus attenuatae, infra sericeo-pilosae, supra glabrae vel glabrescentes, scabrae ; *vaginae* laxae, purpurascentes, teretes, sericeo-pilosae, nodos obtegentes ; *ligulae* membranaceae, angustissimae c. 0·5 mm. latae.

Racemi 5–8, dense digitato-conferti, simplices, erecti, stricti, usque 9 cm. longi, aureo-pilosi ; spiculae ad quemvis rhacheos nodum binae, pedicellatae a pedicello demum solutae, sessiles cum pedicello et cum articulo accumbente decidentes ; rhachis fragilis ; articuli 3·5–5 mm. longi, angulati, angulis dense ciliati ; pedicelli similes sed breviores. *Spicula sessilis* ; *gluma inferior* 4·5 mm. longa, bicarinata, dorso plana vel concava, 2-nervis, elliptico-acuta, dorso inferiore ½ pilis longis aureo-albis obtecta ; *gluma superior* navicularis, compressa, 1-nervis, aristata ; arista 12 mm. longa. *Anthoecium inferius* vacuum ; *lemma* hyalinum, 4 mm. longum, oblanceolato-acutum, marginibus ciliatum ; *palea* nulla. *Anthoecium superius* ♀ ; *lemma* 4 mm. longum, hyalinum, bifidum, lobis 2 mm. longis, arista e sinu emergente ; *palea* 2 mm. longa, ovato-acuta ; *arista* 21 mm. longa ; *columna* 4–5 mm. longa, torta, brunnea ; *lodiculae* 2, cuneato-truncatae ; *stamina* 3 ; *antherae* 2·5 mm. longae. *Spicula pedicellata* similis.

Ind. Or. : Kumaon, 7–8000 ft., 17 Sept. 1884, *J. F. Duthie* 3554 : rocks in Kali Valley (K) ; Nepal, Lete (S. of Tukucha) Kali Gandaki, 9000 ft., 18 Sept. 1954, *Stainton, Sykes & Williams* 7919 ; steep open slopes ; (Type).

This magnificent grass is closest to *Eulalia mollis* under which Duthie's specimen was found. It differs from it by the long-awned upper glume and the longer awn to the upper lemma.

Eulaliopsis sykesii *Bor*, sp. nov. ab *Eulaliopside binata* (Retz.) C. E. Hubbard culmis haud ramosis, inflorescencia singula terminale, racemis aequalibus binis (c. 2·5 cm. longis), arista lemmatis longiore (c. 1·8–2 cm. longa) gluma superiore longa-aristata satis recedit.

Gramen perenne, caespitosum, basi lanata. Culmi basi geniculati, 3–4-nodes, teretes, laeves glabrique, estriati, nodis glabri. *Foliorum laminae* anguste lineares complicatae, rarius planae, in apicem pungentem attenuatae, utrinque pilis brevibus albis e tuberculis ortis hirsutae, 15–20 cm. longae, explanatae 2 mm. latae, marginibus scabrae, junctioni cum vagina pilis albis longioribus praeditae ; *vaginae* superiores arctae lamina redacta, supremae inflorescentiam complectentes, laeves glabraeque, inferiores brevissimae, dense aggregatae, basi dilatatae, lana densa obtectae ; ligula angusta ad seriem pilorum brevissimorum redacta.

Racemi bini terminales 2·5 cm. longi, ex vagina spathiforme suprema emergentes ; articuli pedicellique similes, 1·5–2 mm. longi, basi pilis aureo-rufidulis ipsos aequantibus dense cincti, ceterum laxe breviterque ciliati. Spiculae omnes conformes, 5–5·5 mm. longae ; callus brevis pilis ferrugineis barbatus. *Gluma inferior* oblonga, chartacea, 2–3-dentata, dorso convexa, 7-nervis, costata, marginibus in ½ inferiore pilis rufidulis glumae apicem subattingentibus dense ciliatis, in dorsi media parte cirro ejusmodi pilorum ornata ; *gluma superior* navicularis, inferne dorso rotundata, superne carinata, 3-nervis, apici bilobata, marginibus ciliata, dorso in ⅓ inferiore cirro pilorum brevium ornata, ceterum glabra,

carina scabra, aristata ; arista 8–8·5 mm. longa. *Anthoecium inferius* ♂ ; *lemma* 3·5 mm. longum, hyalinum, oblongum, ellipticum, 1-nerve, apici brevissime hirsutum ; palea 2-nervis, oblonga, angusta, bicarinata, carina in $\frac{1}{3}$ superiore longe ciliata ; *stamina* 3 ; *antherae* 2 mm. longae. *Anthoecium* superius ♂ ; *lemma* 3 mm. longum, angustum, apici bilobatum lobis acutis, hyalinum, 1-nerve, in $\frac{1}{3}$ superiore scabrum, ceterum laeve glabrumque intra lobos aristatum ; *palea* orbicularis, acuta, 2·5 mm. longa, 2 mm. lata, 2-nervis, dorso superne cirro pilorum ferrugineorum ; *stamina* 3 ; *antherae* 3·5 mm. longae ; *styli* 2 ; *stigmata* purpurea, plumosa ; *arista* 18–20 mm. longa, scabra, geniculata ; *columna* torta 5 mm. longa.

NEPAL : Hunta, Nagdung Khola, 5 Sept. 1952, 8,500 ft. *Polunin, Sykes et Williams* 3170—dry open slopes.

This, the second species in a hitherto monotypic genus, is very easily separated from *Eulaliopsis binata* (Retz.) C. E. Hubbard. The latter is a straggling grass reaching 1 m. in height with branched culms, each branch terminating in an inflorescence which consists of 2–4, usually unequal, and often branched racemes. *E. sykesii*, however, has simple culms, few-noded, about 40 cm. tall, ending in a pair of equal racemes. The spikelets and awns of the upper lemma are very much longer than those of *Eulaliopsis binata*, and, moreover, the upper glume is long awned.

Erianthus williamsii *Bor*, sp. nov. cum *E. filifolio* comparanda, sed ab ea spicularum glumis inferioribus dense hirsutis, ramis paniculae ramosis, villis spicularum bruneis nec purpureo-rufis, articulis spiculis aequalibus, culmis infra paniculam glabris nec villosis recedit.

Gramen caespitosum, perenne, rhizomate lignoso, innovationibus intravaginalibus. *Culmi* teretes, glabri, laeves, usque 1·5 m. alti, simplices, nodis glabri. *Foliorum laminae* lineares, in apicem filiformem attenuatae, angustissimae, basin versus sparse villis e tuberculis ortis obtectae, apicem versus glabrae sed marginibus scabrae, usque 1 m. longae, usque 5 mm. latae ; *vaginae* superiores complectentes, glabrae laevesque striatae marginibus membranaceae, auriculatae ; inferiores villis albis densis praeditae, breves ; *ligula* membranacea, 3–4 mm. longa, rotundata vel obtusa.

Racemi subcompositi in paniculam axi commune elongata, racemos inferiores multo superantes, dispositi, pluriarticulati, rhachi articulata, fragile. Spiculae ad quemvis rhacheos nodum binae, pedicellata a pedicello demum soluta, sessili cum articulo pedicelloque demum decidente, ♀, aristata ; articuli 6–7 mm. longi, spiculis aequilongi vel longiores ; pedicelli circa 3 mm. longi, villosi. *Spicula sessilis* ; *gluma inferior* 6 mm. longa, oblongo-elliptica, apici bilobata lobis aristulatis, dorso pilis bruneis densis 3–4 mm. longis obtecta ; *gluma superior* naviculares, 3-nervis, superne carinata, dorso glabra, apicem versus sparse pilis longis praedita, aristata ; arista 3 mm. longa. *Anthoecium inferius* vacuum ; *lemma* ellipticum, acutum, 5 mm. longum, marginibus superne ciliatum ; *palea* nulla. *Anthoecium* superius ♀ ; *lemma* 5 mm. longum, oblongo-ellipticum, bilobatum, arista valida inter lobas emergente, perfecta ; *palea* brevior, 3 mm. longa, oblonga, apici lacerata, hyalina ; *stamina* 3 ; *antherae* 3 mm. longae ; styli 2 ; stigmata purpurea, plumosa; *arista* valida, 15 mm. longa ; *columna* 4 mm. longa, valide torta. *Spicula*

pedicellata sessili simillima sed gluma superior dorso dense pilis bruneis obtecta.

Nepal : Northwest of Gurjakhani, 2850 m., 30 July 1954 ; *Stainton, Sykes & Williams* 3670 (Type) ; Ibidem, 2700, 19 Sept. 1954, idem 4499.

This very distinct species seems to favour dry ridges and has been collected in such habitats in this single area. It is, perhaps, closest to *Erianthus filifolius* (Steud.) Nees but readily distinguishable from it in the characters brought out in the diagnosis.

Poa imperialis *Bor*, sp. nov., cum nullis speciebus Poarum Indiae incolarum comparanda sed ab eis omnibus palea semipilosa, antheris minimis, ligulis longis, basi rhizomatosa, lana nulla satis recedit.

Gramen perenne rhizomatosum. *Culmi* usque 80 cm. alti, basi decumbentes, nodis radicantes, teretes, laeves glabrique, valide striati nodis glabri. *Foliorum laminae* lineares, planae, in apicem acuminatum longe-attentuatae, utrimque glabrae, marginibus scaberulae, basi abrupte contractae ; *vaginae* laxae, demum a culmis solutae, striatae, laeves glabraeque, papyraceae ; *ligulae* membranaceae, 4–6 mm. longae.

Panicula usque 20 cm. longa ; rami bini, angulati, angulis scabri, flexuosi, ramuli bini, spiculas paucas gerentes. *Spiculae* 6-flores, usque 7 mm. longae. *Gluma inferior* 3 mm. longa, explanata 1·5 mm. lata, 1-nervis, elliptico-acuta, dorso curvata, carinata, glabra laevisque sed carinae apicem versus scabra. *Gluma superior* 3·75–4 mm. longa, explanata 2 mm. lata, oblongo-acuta, 3-nervis, ceterum inferiori similis. *Lemma* 5 mm. longum, explanatum 2·5 mm. latum, oblongo-acutum, 5-nerve, marginibus apicem versus hyalinum, dorso glabrum sed nervis longe ciliatum, carina scabrum ; *palea* elliptico-oblonga, bicarinata, carinis semipilosa ; *stamina* 3 ; *antherae* 0·6 mm. longae ; *styli* 2 ; *stigmata* plumosa ; lana nulla ; rhachilla producta, florula imperfecta coronata.

Ind. Or. : Nepal, Tamur Valley, Yangma Khola, N.E. of Walungchung Gola, 14,500 ft., 24 Jul. 1956, *J. D. A. Stainton* 1105—on stones at edge of stream.

This is by far the finest of all the Himalayan Poae.

NOTES ON ASIATIC GRASSES: XXIX.

New Species from Burma

N. L. Bor

Apocopis floccosus *Bor*, sp. nov. ab omnibus speciebus congeneribus basibus culmorum bulbosis floccosis facile distinguitur.

Gramen perenne. Basis culmi bulbosa, lana floccosa obtecta. Culmi usque 40 cm. alti, vaginis fere usque paniculam obtecti, inferne pilis longis appressis pilosi, infra nodos glabrescentes. *Foliorum laminae* usque 14 cm. longae, 6 mm. latae, lineari-acuminatae, superiores redactae, planae, utrimque pilis albis appressis e tuberculis ortis instructae, marginibusque minute scabrae, in sicco brunneae vel nigrae ; *vaginae*

culmum complectentes, striatae, pilis longis albis e tuberculis ortis obtectae ; vaginae infimae lana floccosa instructae ; *ligula* angusta, membranacea, lacerata, 5 mm. longa, margine superiore dense ciliata.

Racemi 3–4, pilosissimi, primo dense appressi, demum divaricati ; axis fere 1 cm. longus, compressus, pilis densis appressis aureis instructus ; racemi usque 6 cm. longi, multiarticulati, rhachidi fragile. Spiculae sessiles ad quemvis rhacheos nodum singulae ; pedicillatae ad pedicellum merum redactae ; articuli 2·5 mm. longi, compressi, superne anguste clavati, marginibus et externe pilis aureis longe pilosi ; pedicellus 4 mm. longus, pilis 3 mm. longis pilosissimi. *Spicula sessilis* ; *gluma inferior* coriacea, 6·5 mm. longa, 2 mm. lata, inferne angustior, superne oblongo-truncata, 3–5-dentata, 9–13-nervis, dorso pilis longis aureis vel albis obtecta, nervis anastomosantibus ; dentes triangulares, marginibus breve ciliati ; *gluma superior* oblongo-truncata, 6·5 mm. longa, explanata 3 mm. lata, 3-nervis, superne scabra, margini ciliata, dimidia parte inferiore dorso pilis aureis instructa. *Anthoecium inferius* ♂ ; *lemma* late lanceolatum, 6 mm. longum, 4 mm. latum, obscure 1-nerve, obtusum ; *palea* abest ; *stamina* 2 ; *antherae* apiculatae, 3·25 mm. longae. *Anthoecium superius* ♀ ; *lemma* 8 mm. longum (lobis acuminatis 2 mm. longis inclusis), lineare, 0·75 mm. latum, 1-nerve, hyalinum, dorso scabrum, sparse pilosum, aristam validam inter lobos emittens ; *arista* 1·5 cm. longa ; *columna* torta, brunnea, 8 mm. longa ; *palea* ovato-oblonga, hyalina, 4·5 mm. longa, 3 mm. lata ; *stamina* 2 ; *antherae* 3·5 mm. longae ; *styli* 2 ; *stigmata* 2, rare 3, longisissima, plumosa.

Burma : Taunggyi. Fairly common on hillsides, 19 June 1948, *U Thein Lwin* 531 (Typus in Herb. Kew.).

F. Kingdon-Ward and his wife spent a year in Burma during 1956–57 and explored thoroughly the vegetation on Mount Victoria in the Chin Hills. This mountain, which reaches an altitude of over 10,000 ft., could be relied upon to provide much of botanical interest since it is an isolated peak separated from Japvo (9,900 ft.) in the Naga Hills to the north by 300 miles of country not above 7,000 ft. in height. The grasses collected on this occasion were entrusted to my care and proved to be of exceptional interest. No less than four were species new to science and are described below. The occurrence of *Andropogon polyptychus* in this area, previously only known from the highlands of Ceylon, adds another to the interesting puzzles of discontinuous distribution of plants. There can be little doubt that our knowledge of the grass flora of this area contains many gaps.

Apocopis anomalus *Bor* sp. nov. ab aliis speciebus hujus generis spiculis pedicellatis distincta.

Gramen perenne. *Culmi* usque 20 cm. alti, graciles, laeves glabrique, 2-nodes, nodis glabris constricti. *Foliorum laminae* usque 8 cm. longae plerumque breviores, 3 mm. latae, lineari-lanceolatae, involutae, revolutae vel planae, basin apicemque versus attenuatae, supra glabrae, scaberulae, infra marginibusque scabrae, sparse pilis albis e tuberculis ortis obsitae ; *vaginae* pilis similibus instructae, striatae, culmos complectentes, inferiores glabrae, breves, lana haud obtectae ; *ligulae* membranaceae, rotundatae, 1 mm. longae.

Racemi 2–3, terminales, subdigitati, multiarticulati, rhachide fragili. *Spiculae* ad quemvis rhacheos nodum solitariae vel binae, sessiles cum articulo rhacheos et pedicello accumbente dissidentes ; pedicellatae a pedicello disjungentes ; articuli rhacheos 2·5–3 mm. longi, pilis longis albis instructi ; pedicellus usque 4 mm. longus, similis. *Spicula sessilis* ; *gluma inferior* 4·5 mm. longa, explanata 1·25 mm. lata, oblonga, apici truncata, dentata, 5-nervis, nervis lateralibus medianoque prominentibus, dorso inferne pilis longis albis obtecta ; *gluma superior* 5 mm. longa, explanata 2·5 mm. lata, oblongo-truncata, marginibus hyalina, apici ciliata, 3-nervis, laevis, dorso sparsissime pilosa. *Anthoecium inferius* ♂ ; *lemma* 4·5 mm. longum, hyalinum, oblongum, apici ciliato, truncato ; *palea* aequilonga, 2-nervis, hyalina ; *stamina* 2 ; *antherae* 1·5 mm. longa. *Anthoecium superius* ♀ ; *lemma* oblongum, bilobatum, 1-nerve, hyalinum, nervo mediano in aristam 8 mm. longum producto ; *palea* elliptico-oblonga, 4 mm. longa, 2-nervis, hyalina ; *styli* 2 ; *stigmata* plumosa ; *stamina* 2 ; *antherae* 2 mm. longae. *Spicula pedicellata* ; *gluma inferior* 3 mm. longa, 5-nervis, pilosa, apici truncata ; *gluma superior* 3 mm. longa, 3-nervis, dorso pilosa. *Anthoecium inferius* vacuum ; *lemma* oblongum, hyalinum. *Anthoecium superius* ♂ ; *lemma* 2·5 mm. longum, hyalinum, bilobatum. 1-nerve, nervo in aristam 5 mm. longam producto ; *palea* oblonga, hyalina ; *stamina* 2 ; *antherae* 1–1·5 mm. longae.

Burma : Mindat, 5,000 ft., 26 Apr. 1956, F. Kingdon-Ward 22155. A small grass coming up in the burnt and blackened pine forest along the Mindat ridge. (Typus in Herb. Kew.).

This grass is placed in *Apocopis* despite the fact that there are pedicelled spikelets present. The reasons for this conclusion are (1) the number of stamens in each floret is 2, (2) the upper glume is typical of that found in the genus *Apocopis*, it is unawned, oblong-truncate with three parallel nerves, (3) the pedicelled spikelet is not always present and is then represented by the pedicel only. From *Eulaliopsis* it differs in the number of stamens in each floret, the upper glume not being awned and the basal sheaths being glabrous and not woolly.

Agrostis burmanica *Bor*, sp. nov. ab aliis speciebus lemmate e basi aristato, dorso glabro, marginibus piloso, recedit.

Gramen perenne. Culmi usque 60 cm. alti, teretes, striati, laeves glabrique, nodis glabris. *Foliorum laminae* lineares usque 22 cm. longae, 2 mm. latae, in apicem gradatim attenuatae, utrinque scaberulae, glabrae, marginibus scabrae ; *vaginae* inferne laxae papyraceae, a culmis solutae, superne culmos complectentes, glabrae striatae, scaberulae vel glabrae ; *ligulae* membranaceae, 1·5–2 mm. longae.

Panicula usque 16 cm. longa, erecta, purpurea ; rhachis angulata, laevis, glabra ; rami nodis 3–4-nati, flexuosi ; ramuli binati, laeves. *Spiculae* 3–4·5 mm. longae, fusiformes, anthesi hiantes. *Gluma inferior* 3 4·5 mm. longa, 1·2 mm. lata, lanceolato-acuta, 1-nervis, laevis, glabra, apicem versus carinata, carina scabra ; *gluma superior* 3–3·5 mm. longa, 0·8 mm. lata, 1-nervis, ceterum glumae inferiori similis. *Lemma* 2–2·5 mm. longum, dorso rotundatum, glabrum sed marginibus pilosum, 5-nerve, nervo medio in aristam perfectam 5 mm. longam e basi producto, nervis lateralibus in aristas brevissimas emergentibus ; *palea* 2 mm.

longa, 2-nervis, hyalina ; *stamina* 3 ; *antherae* 1·3–1·5 mm. longae ; *styli* 2 ; *stigmata* plumosa ; *caryopsis* non visa.

BURMA : Summit of Mount Victoria, 10,000 ft., 1 Nov. 1956. *F. Kingdon-Ward* 22816—gregarious grass, open southern slopes, partly sheltered by trees, abundant. (Typus in Herb. Kew.).

Agrostis mackliniae *Bor*, sp. nov. cum *Agrostide inaequiglumis* Griseb. comparanda sed ab ea habitu perenne, spiculis majoribus, foliorum laminis longioribus latioribusque recedit.

Gramen perenne, caespitosum, culmis multis, radice lignoso. *Culmi* usque 30 cm. alti, teretes, glabri laevesque, ex vagina superiore longe exserti vel usque basin paniculae vaginis obtectae, nodis glabri. *Foliorum laminae* vaginarum inferiorum usque 10 cm. longae, complicatae vel involutae, in apicem scabrum attenuatae, utrimque glabrae, scaberulae, eae superiorum usque 3 cm. longae, angustae ; *vaginae* inferiores laxae, scariosae, a culmis solutae, superiores culmos complectentes, laeves glabraeque ; ligulae membranaceae, usque 5 mm. longae.

Panicula angusta 5 mm. lata, usque 7 cm. longa ; rami 1·8 cm. longi, dense spiculati, scaberuli ; axis angulatus, glaber laevisque vel scaberulus. *Spiculae* 2·5–3 mm. longae, lanceolatae. *Gluma inferior* 2·5–3 mm. longa, explanata lanceolata vel elliptico-acuminata, 1-nervis, apicem versus acuminata, glabra ; *gluma superior* similis sed brevior. *Lemma* late elliptico-acutum, 1·5 mm. longum, omnino glabrum, 5-nerve, callo glabro ; *palea* nulla. *Stamina* 3 ; antherae crassae, 0·75 mm. longae ; *styli* 2, breves ; *stigmata* plumosa. *Caryopsis* non visa.

BURMA : Mount Victoria, 3,000 m., 9 Apr. 1956, F. Kingdon-Ward 21979—Flowering haulms growing out of charred tufts at the summit. The slope had been swept by fires earlier in the year but the steep stony slope is not continuously covered with vegetation (Typus in Herb. Kew.).

This species resembles *A. inaequiglumis* Griseb. but it is a perennial with a woody rootstock. It has been called after Mrs. Jean Kingdon-Ward (née Macklin) to whose presence the success of the last three expeditions carried out by Frank Kingdon-Ward, has been undoubtedly due.

Tripogon wardii *Bor*, sp. nov. ab aliis speciebus hujus generis Indiae Burmaeque incolis, lemmati inferiore vacuo, ab lemmatibus superioribus diverso, distincta.

Gramen probabiliter perenne, caespitosum sed basis plantae abest. Culmi usque 45 cm. alti, graciles, teretes, striati, laeves glabrique, nodis glabri. *Foliorum laminae* lineares, demum involutae, 1–1·5 mm. latae, usque 15 cm. longae, in apicem acuminatum longe attentuatae, utrimque pilosae ; *vaginae* teretes culmos complectentes, striatae, pilosae ; *ligulae* membranaceae, angustissae, laceratae.

Inflorescentia spica terminalis, unica, usque 11 cm. longa, fusca. *Spiculae* 7–8-flores, sessiles, rhachin continuam secus 2-seriatim inferne subdissitae superne imbricatae, unilaterales ; rhachilla supra glumas et inter flores articulata, floribus inferiore vacuo excepto hermaphroditis. *Gluma inferior* 3·5 mm. long, oblique uno lateri lobo obtuso praedita, 1-nervis ; *gluma superior* 5–5·5 mm. longa, lanceolato-acuta, 1-nervis, paulo obliqua sed sine lobum, ambae laeves glabraeque. *Lemma inferius* vacuum, 6 mm. arista 1 mm. longa inclusa, longum, ovatum, 1-nerve,

nervo in aristam producto ; palea minima, hyalina. *Lemma secundum* et lemmata sequentia hermaphrodita, eorum *lemma inferius* oblongum, sine aristam 5 mm. longum laeve glabrumque 3-lobatum, lobo medio bifido, 3-nerve nervis e lobis lateralibus et sinu medio in aristas productis ; aristae 2–3 mm. longae ; *palea* elliptico-acuta, hyaline, bicarinata, carinis ciliatis ; *stamina* 3 ; *antherae* 2 mm. longae ; *styli* duo, longi ; *stigmata* plumosa ; caryopsis non visa.

Burma : Mount Victoria, 9–10,000 ft., 4 Nov. 1956, *F. Kingdon-Ward* 22821—on rocky southern slopes in tufts (Typus in Herb. Kew.).

The lowest lemma of *T. wardii* is different in shape from all the other succeeding lemmas being 1-awned instead of 3-awned. Moreover it is different in sex being empty, at least in about 20 spikelets dissected.

NOTES ON ASIATIC GRASSES : XXX.
New Bamboos

N. L. Bor

Arundinaria wardii *Bor*, sp. nov. Bambusa gregalis. Culmi graciles, usque 2·5 m. alti, flavi, solidi (teste Kingdon-Ward). *Foliorum laminae* ramorum ultimorum usque 15 cm. longae, 18 mm. latae, lineari-lanceolatae, acuminatae, in apicem longum filiformem attenuatae, basi in petiolum brevem crassum abrupte contractae, utrimque laeves glabraeque supra virides, infra glaucae, marginibus scabrae, nervis tessellatis ; petiolus supra pilis brevibus albis obtectus ; culmorum *vaginae* ignotae, eae ramorum ultimorum arctae, coriaceae, striatae, laeves glabraeque, auriculatae ; auricula setifera ; seta usque 2·5 cm. longa ; *ligula* brevis, coriacea.

Panicula brevis, congesta, terminalis, usque 5–9 cm. longa, 4 cm. lata ; axis filiformis, laevis glaberque ; rami ramulique similes. *Spiculae* 20–25 mm. longae, 2–3-flores, fusco-brunneae. *Gluma inferior* 2–5 mm. longa, lineari-acuminata, a latere visa paene aciculata, saepe curvata, 1-nervis, laevis glabraque ; *gluma superior* 7–8 mm. longa, 2 mm. lata, elliptico-acuminata, apicem versus saepe obliqua, 3-nervis, in setam scabram 1–1·5 mm. longam attenuata, dorso laevis glabraque. *Anthoecium inferius* ♂ ; *lemma* 9–11 mm. longum, 3 mm. latum, ovato-elliptico-acutum, aristatum, 5–7-nerve, nervis anastomosantibus, carinatum, dorso omnino pilis brevissimis appressis obtectum, carina scabrum ; *arista* crassa, scabra, 1–1·5 mm. longa ; *palea* lemmati aequilonga, bicarinata, coriacea, carinis scabra ; *stylus* 1 ; *stigmata* 3 ; *stamina* 3 ; *antherae* 6 mm. longae ; *lodiculae* 2, rhomboideae ; *rhachilla* producta, spiculam imperfectam, subulatam, 6–7 mm. longam gerens ; *articuli* rhachillae c. 2 mm. 4 mm. et 6·5 mm. longi, paulo explanati, praecipue apicem versus pilosi ; *caryopsis* non visa.

Burma : Hills east of the Nam Tamai 27° 50′ N., 97° 50′ E., 2500-3000 m., 18 Aug. 1937, *Kingdon-Ward* 12966—abundant among the scrub along the ridge, where it grows 6–8 ft. high. It probably has a much greater vertical range than that given above, and varies much in size and height. Always gregarious. Leaves conspicuously glaucous beneath. Grows either in shade in the forest or in the open. A few plants flowering (This specimen is in flower and is the type ; it is in Herb. BM.) ; ibidem, 27° 45′ N., 97° 45′ E., 2–2500 m., 17 Nov. 1937, Kingdon-Ward 13516—More or less gregarious along the ridge associated with a narrow-leaved species (sterile); Mungku Hkyet, 27° 45′ N., 97° 50′ E., 2800–3200 m., 21 Aug. 1937, *Kingdon Ward* 13012—gregarious along the exposed ridge and on many of the higher slopes facing south and east. Height 6–8 ft. ; stems yellow, solid (sterile).

I have referred the two sterile sheets to the species on account of the similarity of the leaves, the long filiform tips of which are quite striking. It must, however, be emphasised that these two sheets exhibit a feature which I have not been able to make out on the flowering sheet. The sheath of the youngest leaf on the shoot is furnished with a scabrid bristle on the auricle up to 2·5 cm. long. This is quite distinct on the leafy shoots of the sterile material. The bristle is absent in the flowering material. This, however, is to be expected since the bristle is caducous and is only to be made out on the youngest shoots. Panicles are produced on the shoots of the previous year.

Cephalostachyum scandens *Bor*, sp. nov. cum *C. pallido* Munro comparandum sed ab eo capitulis minoribus, bracteis haud aristatis, spiculis minoribus, habitu scandente differt.

Bambusa gracilis. *Culmi* gregales, caespites haud formantes sed alti scandentes, et a ramis arborum penduli ; ramuli ultimi gracillimi, laeves, nitidi. *Foliorum laminae* lineari-lanceolatae, in apicem longum filiformem attenuatae, 8–22 cm. longae, 11–22 mm. latae, glaucae, infra laeves glabraeque, supra papillosae, glabrae vel sparse pilis albis obtectae, nervo medio dense pilis brunneis appressis obtecto, marginibus scabrae, basi in petiolum crassum rotundatae ; nervi numerosi, haud tessellati ; culmorum *vaginae* ignotae, eae ramulorum ultimorum infra inflorescentiam arctae, coriaceae, striatae, margine singulo ciliatae, auriculatae, auriculis setis longis scabris praeditis ; *ligula* coriacea, brevis.

Inflorescentia pedunculata, globosa, multis spiculis fertilibus sterilibusque, bracteis bracteolisque suffulta ; bracteae basales ovatae, 15 mm. longae, 5 mm. latae, c. 13-nerves, marginibus ciliatae, apici lamina imperfecta vel seta valida praeditae. *Spiculae* lanceolatae, basi bracteolis 2 suffultae ; bracteolae anguste lanceolato-acuminatae, carinatae, carina pilis e tuberculis ortis praeditae, lateribus pilosae, 5·5 mm. longae, 1 mm. latae. *Gluma prima* lanceolato-acuminata, 6 mm. longa, 1·25 mm. lata, 3-nervis, inferne dorso rotundata, superne carinata, dorso superne sparse pilosa ; *gluma secunda* 6 mm. longa, 2·25 mm. lata, late elliptica, 7–9-nervis, superne scabra ; *gluma tertia* 6·5 mm. longa, 3·25 mm. lata, late ovata, obtusa, 9–11-nervis, nervis anastomosantibus. *Lemma* 8 mm. longum, 5 mm. latum, ovato-orbiculare, apici truncatum, 9–11-nerve, laeve glabrumque, nervis anastomosantibus ; *palea* oblongo-elliptica, 8–9 mm. longa, 5 mm. lata, nervis medianis validis 2 ; *lodiculae* 3, 2 similes, 4·5 mm. longae, 1·5 mm. latae, tertia 1 mm. lata ; *ovarium* explanatum ; *stamina* 6 ; *antherae* 6 mm. longae.

Burma : Valley of the Nam Tamai 27° 50′ N., 97° 45′ E., 1100 m., 1 Sept. 1937 *Kingdon-Ward* 13096—stems very thin, tapering to whip-like extremities, branching

frequently ; the branches as long as the main fork. In great sheaves growing up through the trees, the branches going from tree to tree and ultimately drooping, sometimes to the ground. In jungle along the path. Has flowered this year ; abundant in places, gregarious ; ibidem, 28° 0′ N., 97° 40′ E., 1600–1800 m., 5 Sept. 1937, *Kingdon-Ward* 13127—a climbing or semi-climbing species. Stems very thin, whip-like. Scarcely forming well-defined clumps but making up much of the undergrowth in places. The branchlets are borne all round the stem and not on one side only. Common along the ridge for a limited distance ; Hkinlum, North Triangle, 1050 m., 27 Apr. 1953, *F. Kingdon-Ward* 20734 ; a thin straggling, scrambling bamboo, growing in forest lining the banks of a mountain torrent ; ibidem, 1200 m., 23 Aug. 1953, *F. Kingdon-Ward* 20262 ; in forest (Typus in Herb. Kew.).

Arundinaria macclureana *Bor*, sp. nov. Bambusa caespites pergrandes in Querceto Picetoque formans. *Culmi* usque 5 m. alti, 5 cm. diametro, laeves glabrique, nodis labrosis glabris ; culmi juvenes cerosi. *Foliorum laminae* usque 9 cm. longae, 11 mm. latae, lanceolato-acutae, in apicem acutum attenuatae, basi ad petiolum brevem contractae, supra laeves glabraeque, infra omnino praecipue ad nervum medium pilis hyalinis mollibus obtectae, marginibus spinuloso-scabrae, nervis anastomosantibus ; culmi *vaginae* non visae, sed eae ramulorum aggregatae, striatae, coriaceae, laeves, inferne glabrae sed superne hirsutae, auriculis ciliatis ; *ligula* brevis coriacea.

Paniculae ramulis terminales, parvi-spiculatae, in ultimarum foliorum vaginarum axillis pedunculatae. *Spiculae* 2–2·5 cm. longae, oblongo-ellipticae vel lanceolatae, purpureae, 5–7-flores. *Gluma inferior* lanceolato-acuminata, 9–9·5 mm. longa, explanata 2·5 mm. lata, carinata, 5-nervis, dorso laevis glabraque, carina inferne scabra, superne scaberrima; *gluma superior* 12 mm. longa, explanata 3·5 mm. lata, late elliptico-acuminata, 7-nervis, nervis anastomosantibus dorso laevis glabraque sed carina scabra vel scaberrima. *Lemma* 15 mm. longum, explanatum 5 mm. latum, late elliptico-acuminatum, dorso rotundatum, apicem versus carinatum, dorso puberulum, aristatum (aristula 2 mm. longa, scabra), marginibus prope apicem ciliatum ; *palea* 9–10 mm. longa, elliptico-acuta, 2-carinata, nervis anastomosantibus, carinis ciliata ; *stamina* 3 ; *antherae* 5·5 mm. longae ; *stylus* 1 ; *stigmata* 2, plumosa ; *lodiculae* 3 ; laterales 2, oblique-acutae, 2 mm. longae, marginibus ciliatae ; adaxialis elliptico-acuta, marginibus ciliatae ; *caryopsis* non visa.

Tibet : Kongbo, Molo, Valley of Lilung Chu, east bank of the river, 3500 m., 23 May 1938, *Ludlow, Sherriff & Taylor* 4395—young bracts on stem purple at first, ultimately straw-coloured ; glumes purple ; anthers greenish yellow, versatile on filiform colourless filaments ; flowering plants precocious, leaves taken from non-flowering plants ; forming clumps in *Quercus* thicket ; Lushu Chu, 3–3500 m., 7 Jun. 1938, *Ludlow, Sherriff & Taylor* 4678—mature canes up to 2 inches in diameter ; glumes dark green with flush of purple ; anthers pendant and versatile, greenish yellow ; forming huge clumps in *Picea* forest ; Langpe-Gyala, 3000 m., 21 Jun. 1938, *Ludlow, Sherriff & Taylor* 5346—covering the slopes of the gorge in places and forming huge clumps ; canes 1 inch in diameter ; glumes purple ; Tsanang La near Paka, 3500 m., 15 Jun. 1938, *Ludlow, Sherriff & Taylor* 5835—5–15 feet : common in mixed forest ; Tripe, Tsangpo Valley, 2800 m., 8 July 1938, *Ludlow, Sherriff & Taylor* 7297—stems 15–20 ft. high ; on steep boulder strewn hillsides (Typus in Herb. BM.).

NEW SPECIES IN PEPEROMIA.

T. G. Yuncker

Peperomia caperata *Yuncker*, sp. nov.

Herba parva carnosa ; caule glabro ; foliis alternis rotundato-ovatis, plicato-bullatis, apice subacutis, basi truncato-rotundatis vel cordatis, peltatis vel subpeltatis, supra ad bullas hirtulis, subtus glabris, palmatim 5–7-nerviis ; petiolo gracili substriato glabro maculis rubris insignito ; spicis numerosis axillaribus dissite florigeris ; pedunculo quam petiolo longiore glabro maculis rubris insignito ; bracteis rotundato-peltatis ; ovario globoso-turbinato, stigmate apicali papillato ; drupa globoso-obovoidea.

A small succulent essentially glabrous herb with short fleshy stems up to 3–4 mm. in diameter and 3 cm. or more high, simple or branching from the base. Leaves alternate or appearing clustered because of scarcely elongated internodes, the blade ovate or round-ovate, the apex bluntly pointed, the base rounded or truncate, peltate within 5 mm. from the margin, or slightly to deeply cordate and narrowly to scarcely peltate, 5–7-palmately nerved, the nerves branched upward, with inconspicuous anastomosing nervules, commonly 1·5–2·8 cm. wide and 2–3·5 cm. long, shining vivid dark green and strongly plicate-bullate above with the bullae minutely hispidulous, paler and glabrous beneath ; petioles slender, up to 7 cm. or more long, green flecked with minute red spots, slightly ridged above by the decurrent nerves, dilated and clasping at the base. Spikes from the upper leaf axils, numerous, the flowering part white, mostly 4–6 cm. long, loosely flowered, the peduncle up to 10 cm. or more long, rose-red flecked with deeper red, the bracts rounded-peltate with somewhat irregular margin, glandular-dotted, the stamens 2, lateral, the ovary obovoid-subturbinate with large, essentially apical, sometimes bifid, puberulent stigma, the drupe globose-obovoid.

The country of origin unknown. Type in Herb. Kew., taken from a plant cultivated by Mr. Maurice Mason, Talbot Manor, Kings Lynn, November 27th, 1956.

This is a very attractive species with its vivid green, strongly plicate-bullate leaves, white spikes and red petioles and peduncles. The leaves spread to form a dome up to 9 cm. high and 13 cm. in diameter above which rise the numerous spikes. It has entered the trade extensively both in Europe and in America where it has become quite popular as a cultivated ornamental house plant under the name of *Peperomia caperata*. It is not known who gave the plant this very appropriate Latin epithet, which means " wrinkled ". It has been thought best to retain and legitimise this name, which has not been previously used in the genus, and also because of its present wide-spread accepted use horticulturally. This species is most closely allied with those included in the subgenus *Tildenia* Miq.

Peperomia griseo-argentea *Yuncker*, sp. nov. *Herba* parva glabra carnosa ; foliis alternis rotundato-ovatis, apice rotundatis vel subacutis, basi rotundato-cordatis peltatis, palmatim 9-nerviis ; petiolo maculis rubris insignito ; spicis axillaribus haud conferte florigeris ; pedunculo

maculis rubris insignito ; bracteis rotundato-peltatis ; ovario globoso-turbinato, stigmate apicali papillato.

A comparatively small glabrous succulent herb, the stem 4–5 mm. in diameter and 2–4 cm. high, the internodes very short. Leaves alternate, the blade round-ovate (2·5–) 4–6 cm. wide and up to 7 cm. long, the apex rounded or slightly pointed, the base rounded-cordate, peltate within 1 cm. of the margin, some leaves very narrowly so, the lobes connivent or more commonly slightly overlapping, glossy and grey or silvery green above with the areas along the depressed nerves slightly dark-purplish, paler and dull beneath, palmately 9-nerved, the nerves branched upward, with fine obscure anastomosing nervules, sometimes plicate and moderately to strongly bullate ; petiole 3–5 or up to 9 cm. or more long, finely ridged above by the decurrent nerves, flecked with short red lines, flattened and widened at the base. Spikes axillary, the flowering part 4 mm. in diameter and 5–10 or 11 cm. long, rather closely flowered, the peduncle at maturity up to 12–14 cm. long, flecked with short red lines, the bracts round-peltate, glandular-dotted, the stamens 2, lateral, the ovary obovoid-subturbinate, somewhat angular, the stigma fleshy, apical, commonly bifid, papillate.

The country of origin unknown. Type from a cultivated specimen, in Herb. Kew., 1956, said to have been received from the shores of the Mediterranean. A plant of the same species, which flowered at Kew in 1936, was brought by Mr. C. H. Lankester from Teneriffe.

This is an attractive plant characterized by its rounded, cordate, peltate, often bullate, shining and greyish or silvery green leaves. It has gained popularity as a pot herb both in Europe and in America where it is listed under a number of names none of which is believed to be legitimate. This species appears to be most closely allied with those included under the subgenus *Tildenia* Miq.

***The Garden Frame.**—Describes numerous types of frame and the many uses to which this piece of equipment can be put, including its use in propagation, for pot plants and bulbs, and for the cultivation of vegetables, violets, anemones and strawberries. The last two chapters deal with continuous cloches and their use in the cultivation of early crops of lettuce, peas, beans, strawberries and tomatoes. Illustrated by a number of line drawings.

†**Garden Planning.**—A simple guide to the subject, giving advice and suggestions in design, the use of raw material, the treatment of soils, the planning of lawns, rock gardens and the construction of pools. A very useful little book for those intending to make a garden, illustrated by a number of diagrams showing the lay-out of different types of gardens.

H. S. MARSHALL.

*The Garden Frame. "Amateur Gardening" Handbook no. 27. By L. N. Flawn. Pp. 92. 18 line drawings. 4/-. 1957.

†Garden Planning. "Amateur Gardening" Handbook no. 32. By S. J. Poole. Pp. 92. 23 sketch-plans. 4/-. 1957.

TWO NEW SPECIES OF MICROTHYRIELLA IN BRITAIN.

C. Booth

No species of *Microthyriella* have previously been recorded in Britain. The genus was erected by von Höhnel (1909) and transferred by Theissen (1913) to the *Hemisphaeriaceae*. The family was proposed by Theissen for species with non-inverse and non-radiate thyriothecia. These had previously been placed in the *Microthyriaceae*, which was retained for species with inverse and radiate thyriothecia.

The *Hemisphaeriaceae*, or "fly-speck" fungi are a predominantly tropical family and are strictly superficial on the surface of stems or leaves. The flattened, circular and usually black thyriothecia has given them their popular name. Only one record, *Clypeolum juniperum* Grove is listed for Britain in Bisby & Mason's (1940) List of British Pyrenomycetes, this occurs under *Micropeltaceae* although the genus is usually considered as belonging to the *Hemisphaeriaceae*.

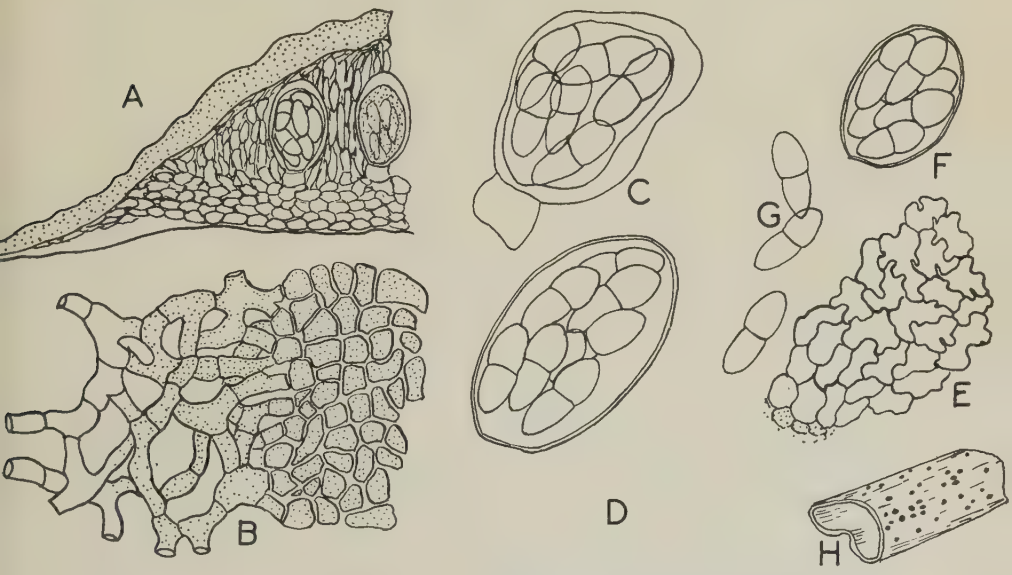


Fig. A–D. Microthyriella paludosa ; A. half longitudinal section of thyriothecium ; B. edge of thyriothecial wall ; C. immature ascus ; D. mature ascus.

Fig. E–H. Microthyriella osmundae ; E. edge of thyriothecial wall ; F. mature ascus ; G. ascospores ; H. habit sketch, thyriothecia on rachis of Osmunda. A. × 400. B.–G. × 1000. H. nat. size.

Microthyriella paludosa *Booth*, sp. nov.

Thyriothecia dispersa, atra, orbiculata, non-ostiolata, 140–160μ dia. ; paries pseudoparenchymatus usque ad reticulatus. *Asci* ovales vel clavati, 8-spori, sessiles, 24–26 × 16–18μ, aparaphysati. *Sporae* hyalinae, clavulatae, 1-septatae, 11–13 × 4–5μ cellula superiore paulo crassiore, inferiore paulo longiore.

Hab. in foliis *Cladii marisci*, Wheatfen Broad, Norfolk, *M. B. Ellis*. June 1946. Herb. IMI.34621 and Herb. R.B.G. Kew.

The thyriothecia are closely scattered, amphigenous, black, pseudo-parenchymatous with a marked reticulate appearance and measure 140–160μ in diameter. They are non-ostiolate and spore discharge follows radial splitting and finally disintegration of the central region of the wall. The asci are oval to broadly clavate with a flattened basal region. They have 8-ascospores and measure 24–26 × 16–18μ. No true paraphyses are present. *Ascospores* are clavate, hyaline, one-septate, with a broader but shorter upper cell and a narrow but longer basal cell, they measure 11–13 × 4–5μ.

On *Cladium mariscus*, Wheatfen Broad, Norfolk.

Type coll. *M. B. Ellis*, June 1946 in Herb. IMI.34621 and Herb. R.B.G. Kew.

A further collection is in Herb. IMI. (15489) *E. A. & M. B. Ellis*, May 1947.

The asci are erect in the thyriothecia. They appear to be in separate locules which are formed in pseudoparenchymatous tissue with very thin walls. No differentiation of the basal wall occurs, and there is no penetration of the epidermal cells of the host.

Microthyriella osmundae *Booth* sp. nov.

Thyriothecia dispersa, atra, orbiculata, non-ostiolata, 130–170μ dia. ; paries pseudoparenchymatus, convolutus. *Asci* subglobosi, 8-spori, sessiles 17–18 × 13–15μ, aparaphysati ; paries 1½–2μ. *Sporae* clavulatae, hyalinae, 1-septatae, 9–11 × 3·5–4μ, utrinque rotundatae, cellula superiore paulo crassiore, inferiore paulo longiore.

Hab. in rachis *Osmundae regalis*, Wheatfen broad, Norfolk. *R. W. G. Dennis*, July, 1955. Type coll. in Herb. IMI.61053 and Herb. R.B.G. Kew.

The black, circular and superficial thyriothecia consist of thin convoluted pseudo-parenchymatous, non carbonaceous tissue with an irregular margin, and are 130–170μ in diameter. No ostiole is present, when mature the central region fragments, first by slits radiating from the centre then by disintegration of intervening parts of the wall. The asci are globose to oval and have eight conglobate spores, they measure 17–18 × 13–15μ and have an even wall 1½–2μ thick. In place of true paraphyses thin walled cells form an interascal tissue. The ascospores are clavate, hyaline, 1-septate 9–11 × 3½–4μ, the upper cell is shorter and broader whilst the lower is narrower but attenuated. When the ascospores are fully mature fine longitudinal striations are visible on some spores.

Type coll. *Osmunda regalis*, Wheatfen broad, Norfolk. *R. W. G. Dennis*, July 1955, Herb. IMI.61053 and Herb. R.B.G. Kew.

Literature cited

Bisby, G. R. and Mason, E. W., *Trans. Brit. Mycol. Soc.*, XXIV, pp. 127–243, 1940.
Höhnel, von F. *S.B. Akad. Wiss. Wien*, 118, p. 370, 1909.
Theissen, F. *Ann. Mycol.* Berl., 11, p. 468, 1913.

NOTES ON ASIATIC GRASSES : XXXI.

A new Genus of Grasses

N. L. Bor and C. E. Hubbard

In Notes on Asiatic Grasses : I, The genus *Danthonia* in India [Kew Bull. 1952, 78 (1952)] one of us (N.L.B.) mentioned that *Danthonia himalaica* first collected by Duthie, and described by J. D. Hooker, differed from its congeners in the possession of a long membranous ligule, in its hairy ovary and in its very firm glumes. To these differences must be added the discovery that the ovary is crowned by 3 styles each ending a long plumose stigma. These characteristics separate the plant from other species of *Danthonia* and even render its position in *Danthonieae* anomalous. We have decided therefore that this species is deserving of generic rank and have, moreover, removed it from the *Danthonieae* where it is obviously out of place. We place it tentatively in *Aveneae*, which seems in the present state of our knowledge, most suitable to receive it.

Pseudodanthonia *Bor et Hubbard.*

Genus novum *Avenearum* cum *Helictotricho* comparandum sed ab eo praecipue stylis tribus et, inter alia, glumis quam anthoecia longioribus, inferiore 5–7-nerve, superiore 7–9-nerve, nervulis anastomosantibus paucis, lemmate apici breve bidentato 7–9-nerve aureo-brunneo aristato, arista inter dentes emergente, lodiculis duabus obovato-rotundatis carnosis, ovario ellipsoideo basin versus glabro superne hirsuto satis distinctum.

Spiculae anguste oblongae, demum cuneatae hiantesque, magnae, lateraliter compressae, aristatae, breve pedicellatae, in paniculas angustas aggregatae ; rhachilla supra glumas et inter anthoecia disarticulans, internodiis brevibus glabris. *Anthoecia* 4–8, ♀ ; callus obtusus, dense prominenterque barbatus. *Glumae* persistentes, magnae, inaequales, anthoeciis longiores, dorso rotundatae, scarioso-chartaceae, marginibus hyalinae, aureo-brunneae ; inferior superiore brevior, 5–7-nervis ; superior 7–9-nervis, nervulis paucis anastomosantibus. *Lemmata* imbricata, dorso rotundata, lanceolata, apici breve bifida, dentibus angustis setiferis, coriacea, 7–9-nervia, nervis apicem versus convergentibus, dorso infra medium sparse pilosa, ceterum glabra, e sinu aristata; columna adaxialiter concava, abaxialiter convexa, angulis brevissime hirsuta. *Paleae* lemmatibus multo breviores, oblongae, bilobatae, bicarinatae, inter carinas anguste alatas concavae, scarioso-membranaceae, glabrae. *Lodiculae* 2, late obovato-rotundatae, glabrae, pauci-nerves, carnosae. *Stamina* 3 ; *antherae* angustae, oblongae. *Ovarium* ellipsoideum, basin versus attenuatum, glabrum, superne breve hirsutum ; *styli* 3, breve sparseque pubescentes ; *stigmata* longa, plumosa, alba. *Caryopsis* juventute hilo lineari, ½ breviore praedita.

Gramina perennia dense caespitosa ; culmi erecti, graciles, simplices, nodis paucis basi aggregatis ; foliorum vaginae apici in auriculas erectas membranaceas ad ligulas adnatas productae ; foliorum laminae linearisetaceae, rigidae, valide convolutae ; ligulae lanceolatae, acutae, membranaceae, glabrae ; panicula contracta, pauci-spiculata, interdum ad racemum simplicem redacta.

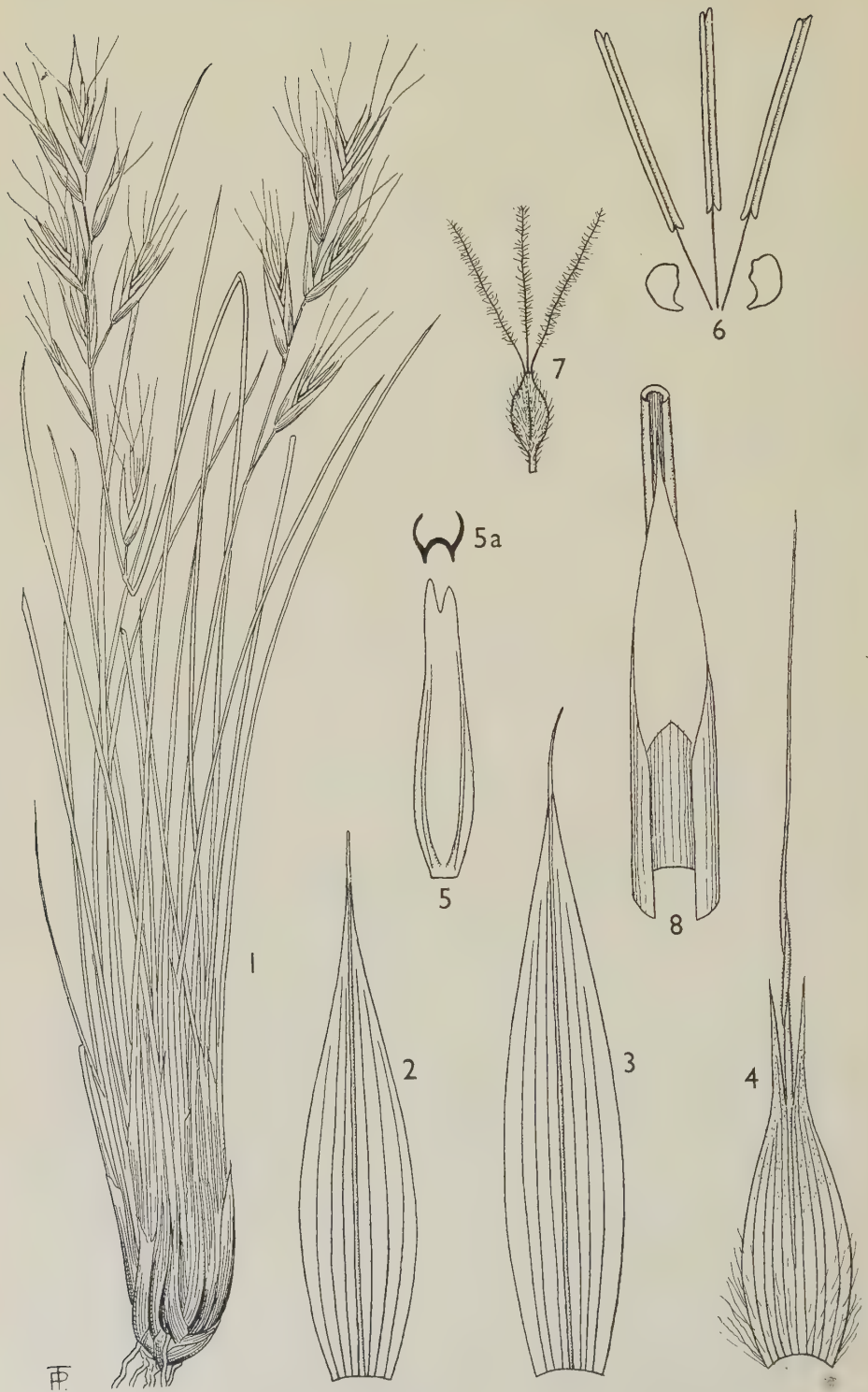


FIG. 1. **Pseudodanthonia himalaica** (*Hook. f.*) *Bor et Hubbard.*
1, plant, × ⅔ ; 2, lower glume, × 4 ; 3, upper glume, × 4 ; 4, lemma, × 4 ; 5, palea, × 4 ; 5a, transverse section of palea ; 6, lodicules and stamens, × 6 ; 7, pistil, × 6 ; 8, ligule, × 6.

Generis typus *Pseudodanthonia himalaica* (Hook. f.) Bor et Hubbard (*Danthonia himalaica* Hook. f.). Species adhuc singula.

Pseudodanthonia himalaica (*Hook. f.*) *Bor et Hubbard* comb. nov.

Danthonia himalaica Hook. f., Fl. Brit. Ind. **7,** 281 (1896).

Gramen perenne, radice lignoso. *Culmi* multi, teretes, usque 45 cm. alti, laeves glabrique, 1–2-nodes. *Foliorum laminae* angustissimae, involutae, lineares, in apicem setaceum attenuatae, usque 30 cm. longae, 1·5–2 mm. latae, flexuosae, coriaceae, supra scaberulae, infra glabrae laevesque ; *vaginae* brevissimae, arctae, coriaceae, striatae, glabrae laevesque, marginibus scariosis productis et ad ligulam adnatis ; *ligulae* membranaceae, usque 7 mm. longae, acutae.

Panicula (vel racemus) usque 9 cm. longa ; axis angulatus, laevis glaberque ; pedicelli spiculis breviores, pilosi. *Spiculae* usque 25 mm. longae, cuneatae, lateraliter compressae, 4–8-flores. *Gluma inferior* 15–20 mm. longa, explanata 4–5 mm. lata, lanceolato- vel elliptico-lanceolato-acuminata, carinata, 5–7-nervis, nervulis anastomosantibus paucis, aureo-brunnea, dorso laevis glabraque, carina scabra ; *gluma superior* similis sed major, usque 25 mm. longa, 7–9-nervis, breve-setulosa. *Lemma* usque 14 mm. longum, dorso rotundatum, chartaceum, 7–9-nerve, dorso inferne pilis albis obtectum, bilobatum, in sinu aristatum ; lobi 4 mm. longi, acuminati vel brevissime aristulati ; *palea* 9 mm. longa, bicarinata, apici bifida, carinis anguste alata ; *arista* usque 20 mm. longa ; columna 10 mm. longa, abaxialiter convexa, adaxialiter concava, semel torta ; *ovarium* ellipsoideum, breve hirsutum ; *styli* 3 ; *stigmata* longa, plumosa ; *stamina* 3 ; *antherae* lineares, 4·5–5 mm. longae.

Ind. Or. : N.W. Himalaya. Tehri Garhwal, Lakandi Peak, N.E. Side, 2,600–3,000 m., 14 Apr. 1894, *J. F. Duthie* 14467 ; Jaunsar, rocks on east side of Lakandi Peak, 2,500–3,000 m., 19 Apr. 1894, *J. F. Duthie* 14467 (Holotype, K.), Jaunsar, Deoban, on rocks, 3,000 m., June 1894, *J. S. Gamble* 24856 ; Chansil Ridge, 4,000 m., May 1894, *J. S. Gamble* s.n.

Diseases of Garden Plants.*—This book, based on the author's experience as a plant pathologist for more than twenty years, provides gardeners with an up-to-date manual of plant diseases which is comprehensive, well illustrated and reasonably priced. Diseases of vegetables, flowering plants, ornamental trees and shrubs, lawns, and fruit are dealt with under the various host plants which are arranged in alphabetical order according to their common names. In addition to those caused by fungi, diseases of physiological origin and those due to viruses are covered. The symptoms of each disease are briefly described and control measures given.

D. A. Reid.

* Diseases of Garden Plants. By A. Beaumont, London : W. H. & L. Collingridge Ltd. New York : Transatlantic Arts Inc. 1956. Pp. 152. Illus. 63 Photographs and 16 line drawings. Price 25/- nett.

NOTES ON AFRICAN ROSACEAE : III.

R. A. Graham

Rubus erlangeri *Engl.* and **Rubus aethiopicus** *R. A. Graham*

The type material of the Ethiopian *Rubus erlangeri* was destroyed in Berlin, but a photograph of what appears to be its holotype has recently been lent from Lund, and the most cursory glance at this will suggest a strong affinity (which was not readily appreciable from the type description alone) of this species with my *R. aethiopicus*, recently described. Differences between these two and *R. volkensii* Engl., which also occurs in Ethiopia and to which both have been likened, are as follows :—

R. aethiopicus	*R. erlangeri*	*R. volkensii*
Flowering stems and petioles eglandular except in the immediate neighbourhood of the floral racemes : strongly pruinose.	Flowering stems and petioles densely stipitate-glandular : epruinose.	Flowering stems and petioles densely stipitate-glandular : epruinose.
Leaves whitish-tomentose and eglandular on the under surface.	Leaves whitish-tomentose and eglandular on the under surface.	Leaves green, pilose and glandular on the under surface.
Pedicels 5–15 mm. long.	Pedicels 25 mm. long.	Pedicels up to 30 mm. long.
Calyx 13–15 mm. long.	Calyx ± 20 mm. long.	Calyx 20–25 mm. long.
Petals 9–10 mm. long.	Petals 25 mm. long.	Petals 15–20 mm. long.

It will be seen from the above comparisons that *R. erlangeri* resembles *R. volkensii* in the epruinose, very glandular stalks and petioles, but differs abruptly in the leaf indumentum. From both of these *R. aethiopicus* differs in its pruinose, largely eglandular stalks and petioles, but resembles *R. erlangeri* in the leaf indumentum. As regards the flowers, those of *R. erlangeri* appear to stand midway between the other two (the petal length being probably an unreliable character)

R. erlangeri is certainly different from *R. volkensii*—a species of considerable constancy in essential characters, and never having a whitish-tomentose indumentum on the undersurface of the leaves ; but its resemblance to *R. aethiopicus* is, from its general appearance as shown in the photograph, enough to raise doubt as to whether *R. aethiopicus* is not a pruinose, largely eglandular form of *R. erlangeri* with, in addition, smaller petals and sepals, and shorter pedicels. Alternately *R. erlangeri* can with some justification be considered as intermediate, and perhaps a hybrid, between *R. aethiopicus* and *R. volkensii*. The evidence available will not permit sinking *R. aethiopicus* into synonymy with *R. erlangeri*, but further collecting in the type neighbourhood of both species is needed in order to establish whether the two can remain specifically distinct, or whether the variation of each is broad enough to embrace the characters of the other, in which case synonymy will become inevitable.

IDIOPTERIS: A NEW GENUS OF FERNS FROM CEYLON.

TREVOR G. WALKER

Pteris hookeriana was first described by J. G. Agardh in 1839 from Ceylon material sent to Hooker and Greville by Dr. Emerson. Since then much discussion has occurred in the writings of several fern taxonomists regarding its systematic treatment. Thus, to consider only a few authorities, G. Wall (1873) concluded that *P. hookeriana* was a valid species quite distinct from *P. cretica*, a conclusion directly opposed to that reached by Hooker (1858) who stated " Specimens in our Herbarium . . . differ in no essential particulars from *Pt. cretica* ". Thwaites (1864) steered a middle course and referred to " *Pteris cretica* var. β *P. hookeriana* Ag."

Hence discussion since the formal recognition of *Pteris hookeriana* Ag. has centred upon whether this entity should be given specific or varietal status on the one hand, or whether on the other hand it should be completely united with *P. cretica*. The purpose of this paper is to suggest a new alternative, namely, that the real problem of its systematic position is on the generic rather than the specific level, *i.e.* not simply in its relation to *Pteris cretica* but in its relation to the genus *Pteris* as a whole.

Several though not all of the features advanced below to prove the generic distinctness of *P. hookeriana* have been recognised as important as a result of the relatively recent acquisition of new data (such as has come, for example, from the spectacular growth of cytology in this century) and the growing awareness among systematists of the desirability of studying the living plant and its development whenever possible instead of relying almost exclusively upon evidence derived from often incomplete herbarium specimens. Nevertheless one of the most important features can be seen with the naked eye on herbarium specimens and this has also several times been noted in the literature though without recognition of the full implications. Thus in a letter to J. G. Baker dated April 5th, 1872, Geo. Wall points out that the indusium of *P. hookeriana* is not marginal in position but is intramarginal and he states that this character is constant throughout the large number of specimens that he examined. Wall illustrated this statement by four diagrams comparing the positions of the indusium and sorus in *P. hookeriana* with those in *P. cretica* which are strictly marginal. Beddome *The Ferns of Southern India* t. 40 (1863) clearly illustrates the same feature. Both authors concluded that the distinction was of specific importance and they opposed the merging of *P. hookeriana* with *P. cretica*. Nevertheless Agardh (1839), Hooker (1858) and Thwaites (1864) all apparently overlooked this feature since no mention is made of it in their publications. Admittedly the indusium becomes reflexed in mature fronds and thus hides the narrow strip of frond between the base of the indusium and the frond margin. Nevertheless the submarginal position of the sorus and indusium can be clearly seen on some part of almost any specimen where reflexing of the indusium is not so marked (Plate Fig. A).

That the significance of this observation seems to have escaped the taxonomists quoted appears curious in the light of present knowledge, especially as the strictly marginal position of the indusium is one of the

chief diagnostic features of the genus *Pteris* ; the explanation no doubt lies in the very great superficial resemblance of *P. hookeriana* to *P. cretica*.

Features of spore morphology are of very great importance in the taxonomy of *Pteris* and during a cytotaxonomic investigation of this genus particular attention has been paid to them. There are a very limited number of basic shapes, colours, and markings of the spores in this genus : species differ from one another in spore characters by employing various permutations of these few basic features. The spores of *P. hookeriana*, however, are utterly unlike those of any of the more than one hundred species of *Pteris* that I have examined (Plate Fig. D).

Bower in Vol. I of *The Ferns* (1923) pointed out that the gametophyte may yield characters of great taxonomic importance and this view has been recently elaborated by Alma Stokey and others in *Phytomorphology* and elsewhere (see especially Stokey 1951). The prothalli of *Pteris* are characterised by great uniformity of shape. Prothalli of more than 60 species of this genus have been cultivated at Leeds and all have from the beginning developed symmetrically, resulting in a typically cordate outline. In striking contrast *P. hookeriana* has very distinctive prothalli in which growth does not occur evenly on both sides of the mid-line ; one lobe grows vigorously whilst the other remains retarded, resulting in a very asymmetrical outline (Plate Fig. C).

Pteris also shows great uniformity in chromosome numbers, every species so far examined, regardless of its taxonomic disposal within the genus, having a chromosome number of 29 or a strict multiple of this figure (Manton and Sledge, 1954, Walker 1956, Walker unpubd.). When a single species deviates from the base number otherwise found to be constant throughout a large genus the suspicion immediately arises that such a species has been wrongly included in that genus. This is so with *P. hookeriana* for which the gametophytic chromosome number of 27 has been unequivocally established (Plate Fig. E).

Other features, possibly of less significance, in which *P. hookeriana* differs from all the other members of *Pteris*, are the presence of hydathodes in the sterile fronds and also the fugitive colouring of the first-formed fronds. The first-formed fronds are suffused with a marked pink blush (somewhat reminiscent of that to be seen in the young fronds of *Blechnum orientale* L.) which is absent from older fronds. In other species of *Pteris* a pink colouration has only been seen in the very young fronds when the adult leaves are also pigmented, *e.g. P. aspericaulis* agg. of India, *P. quadriaurita* agg. of Africa, but never in species which lack any pink pigment in the adult condition.

Thus the anomalous position of *P. hookeriana* (which possesses submarginal sori) within a genus that, by definition, contains only elements having strictly marginal sori, is further emphasised by the possession of other characters of great taxonomic importance which are at complete variance with those of all the other members of *Pteris*, in particular in spore characters, the mode of growth of the prothalli, and in the basic chromosome number. The conclusion therefore seems to be inescapable that *P. hookeriana* was incorrectly placed in the genus *Pteris* by Agardh and that it should be removed from it. The monotypic genus *Idiopteris* T. G. Walker is accordingly here proposed to accommodate this species : the name is from the Greek ιδιος ' peculiar, separate '.

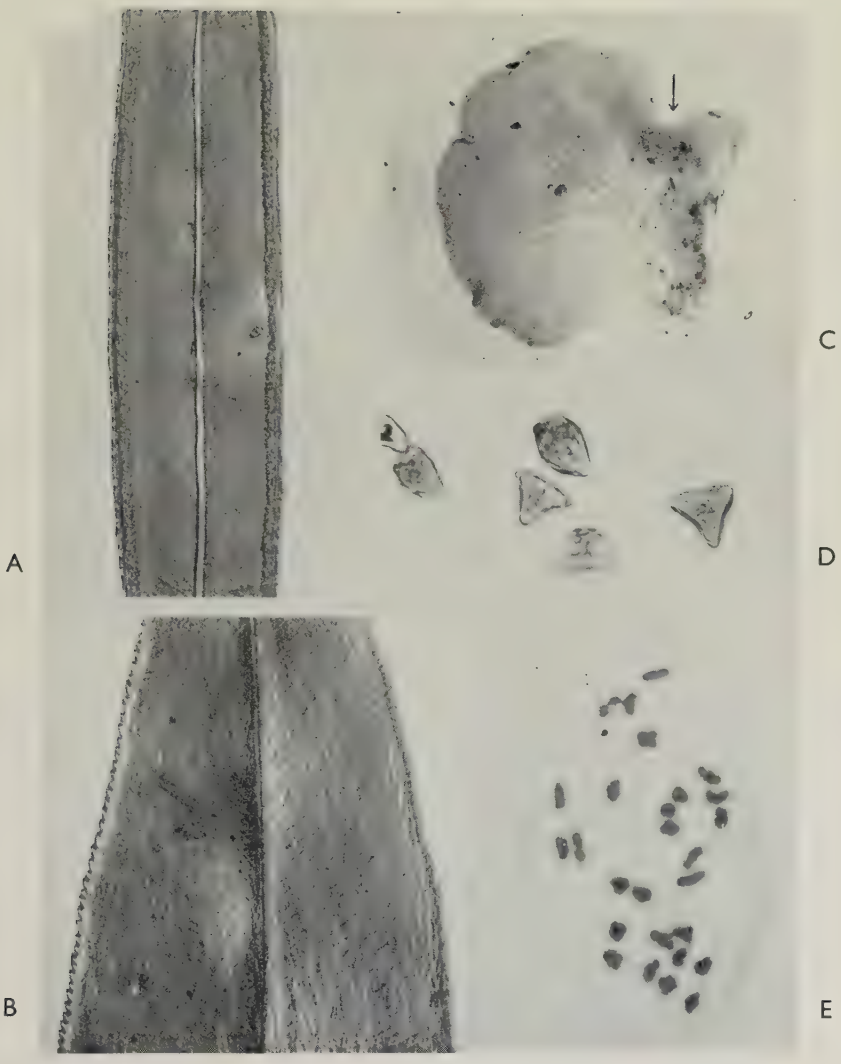


Fig. A. *Idiopteris hookeriana* (Agardh) T. G. Walker, part of a fertile frond, magnified × 2, to show the infra-marginal position of the sporangia.

Fig. B. Part of a sterile frond, magnified × 2.

Fig. C. A prothallus to show the characteristic asymmetrical development, the position of the apex and central cushion marked by the arrow, magnification × 6½.

Fig. D. Spores, magnified × 200.

Fig. E. Chromosomes at the first meiotic metaphase showing 27 pairs, in a permanent aceto-carmine squash, magnification × 1000.

To face page 430]

The affinities of *Idiopteris* are not clear but probably are not to be sought with *Pteris*.

Idiopteris *T. G. Walker*, genus novum.

Filix terrestris, rhizomate longe repente. Frondes stipitatae dimorphae, *fertiles* pinnis semel vel pluries furcatis, venulis liberis, indusiis intramarginalibus integris maturitate reflexis, sporis incoloratis acute triangularibus, *steriles* quam fertiles breviores, pinnis semel furcatis serratis, dente quoque hydathodo claro munito. Chromosomata gametophyti 27.

Typus generis : *Pteris hookeriana* Agardh.

Species unica, Zeylaniae et Indiae (Malabariae) incola.

Idiopteris hookeriana (Agardh) T. G. Walker, comb. nov.

Pteris hookeriana Agardh, Recensio Sp. Gen. Pteridis 12 (1839).

Illustration : Beddome, Ferns S. India, t. 40 (1863).

The description of *Pteris hookeriana* as given by Agardh is unsatisfactory by modern standards and is therefore amplified as follows :—

Filix terrestris, *rhizomate* longe repente (in specimene Sledgei no. 319 c. 8 cm. longo, 4 cm. crasso) paleis 3 mm. longis, 0·5 mm. crassis, subulato-linearibus integris atro-castaneis, cellulis longis angustisque non sinuatis. *Frondes fertiles* ad 70 cm. longae, stipitibus laevibus stramineis sed basi castaneis vel etiam atropurpurascentibus : *lamina* late ovata, ad 35 cm. longa, 28 cm. lata, pinnis ultroque latere 3–6 ; pinnae angustae-oblongae, acuminatae, integrae, apicem versus serratae, ad 1·5 cm. latae, pinnis infimis semel vel pluries furcatis, pinnis supremis simplicibus, pinna terminali pinnis supremis similis ; *textura* firme herbacea vel subcoriacea ; venulis liberis ; sori continui, submarginales ; indusia papyracea, integra, matituritate reflexa ; sporangia longe stipitata, laevia, circa 23 cellulis incrassatis in annulo ; sporae sine colore, acute triangulares, signis rotundis in exine manifestis. *Frondes steriles* breviores quam frondes fertiles, stipitatae ; *lamina* late ovata, ultroque latere 1–3 ; *pinnae* oblongae-lanceolatae, ad 4 cm. latae, serratae dente quoque hydathodo munito, pinna terminali pinnis supremis similis ; *textura* firme herbacea vel subcoriacea. Chromosomata gametophyti 27 ; generatio sexualis.

Ceylon. On bank along path, Kottawa Forest Reserve (Arboretum), Jan. 21, 1951, *F. Ballard* 1538 (K) ; 200 ft., Kottawa Forest Reserve, Jan. 21, 1951, *W. A. Sledge* 403 (BM) ; ground fern in wet jungle, Hedigala, Sinha Raja Forest, Jan. 5, 1951, *F. Ballard* 1397 (K) ; Sinha Raja Forest, near Hedigala, Jan. 5, 1951, *W. A. Sledge* 319 (BM) ; jungle, Hewissa, Jan. 20, 1951, *W. A. Sledge* 392 (BM) ; Kanneliya Forest Reserve, near Udagama, Southern Province, April 2, 1954, *W. A. Sledge* 1387 (BM) ; Gilimale, March 9, 1954, *W. A. Sledge* 1251 (BM) ; on sloping ground in wet forest, Gilimale, near Adam's Peak, March 9, 1954, *T. G. Walker* T716, T717, T718 (BM) ; on ground in wet forest, Gilimale, near Adam's Peak, December, 1956, *J. D. Lovis* T950, T951, T952, T953, T954, T955, T956 (BM) ; 2,000 ft., Adam's Peak, *Gardner* 1242 (K) ; in silvis prov. australis Ceylonae, *G. Wall*, s.n. (BM) ; near Ratnapura, 1853, C. P. 1329 (PDA) ; C. P. 1329 (K, BM, E) ; *A. Oswald Brodie* (labelled *Pteris cretica* var. *Hookeriana*) C.P. 1329 (E) ; *Col. Walker* 11 (K) ; without collector, s.n. (CGE) ; *Gardner* 1329 (K) ; *Capt. Henderson* s.n. (K) ; August, 1865, *C. B. Clarke* C. P. 1329 (K) ; *Wall* s.n. (K) ; *G. Wall* C.P. 1329 (E) ; *Beddome* s.n. (K) ; *Trimen* C. P. 1329 (K) ; *Col. W. Robinson* 90a (K) ; *Capt. A. Anderson* s.n. (E) ; *Wight* 1913 (E) ; *Wight* (labelled *Pteris cretica* L.) 1915 (E) ; *Emerson* 1827 (syntype, E) ; *Emerson* 1828 (syntype, E).

South India. Malabar, *Beddome* specimen figured in Plate XL F. S. Ind. (K).

Acknowledgments

My thanks are due to the Scholarships Committee of the University of Leeds, to the Priestley Fund and to the Agricultural Research Council for their generous financial aid which enabled me to visit Ceylon ; to Mr. A. H. G. Alston and to Mr. W. T. Stearn of the British Museum (Natural History), for much helpful advice ; to Mr. F. Ballard of Kew, and Mr. D. Henderson of Edinburgh for their willing help ; to the Director of Agriculture, Dr. A. W. Joachim and to the Assistant Director, Mr. A. J. Joseph, Peradeniya, for transport facilities ; to Mr. Jayaweera, Superintendent, Peradeniya, and to Mr. P. Senaratne, for arranging for the transport of living specimens to Kew ; to Mr. T. B. Worthington, Kandy, for his very generous help and hospitality during my stay ; to Mr. B. Clarke, Leeds, for photographic assistance. A special debt of gratitude is owed to Prof. I. Manton for her help and encouragement.

References

Agardh, J. G. (1839). *Recensio Specierum Generis Pteridis.* Lund.

Beddome, R. H. (1863). *Ferns of Southern India.* 1st Ed. Madras.

Bower, F. O. (1923). *The Ferns.* Vol. 1. Cambridge.

Hooker, W. J. (1858). *Species Filicum.* Vol. 2. London.

Manton, I. and Sledge, W. A. (1954). Observations on the cytology and taxonomy of the Pteridophyte flora of Ceylon. *Phil. Trans.* 238 *B* : 127–185.

Stokey, A. G. (1951). The contribution by the gametophyte to the classification of the homosporous Ferns. *Phytomorphology*, **1** : 39–58.

Thwaites, G. H. K. (1864). *Enumeratio Plantarum Zeylaniae.* London.

Walker, T. G. (1956). Cytotaxonomic Studies in the Tropical Fern Genus *Pteris.* Ph.D. Thesis, Leeds University. (Unpublished).

Wall, G. (1872). Letter to J. G. Baker in the Herbarium, Royal Botanic Gardens, Kew.

Wall, G. (1873). *A catalogue of the Ferns indigenous to Ceylon.* London.

Town Gardening.*—There must be many town dwellers who have experienced great difficulty in making gardens where poor conditions such as bad soil, lack of air or polluted atmosphere and other such drawbacks exist. In this book Mr. Lanning Roper from his wide experience as a horticulturist describes how one may overcome these disadvantages and produce gardens which can be a source of delight. Here he discusses such problems and their limitations, gives advice on design, the preparation of the soil, the selection of plants, garden ornaments and decoration, pests and diseases, etc., in a most helpful way. He tells us in the preface that his observations are the result of practical experience, of trial and error, and shows what may be accomplished by imagination, ingenuity, patience and perseverance. Lists of suitable plants are given in the appendices including shrubs, trees and herbaceous plants. The book is illustrated with 29 photographs and is provided with a good index. It will be of interest to all town gardeners.

H. S. Marshall.

* Successful Town Gardening. By Lanning Roper. Pp. 183 + 29 ill. London : Country Life Ltd. Price 2 gns.

THE GENUS HYPERICUM IN AFRICA SOUTH OF THE SAHARA, MADAGASCAR AND THE MASCARENES.

N. K. B. Robson

A general review and study of the floral anatomy of *Hypericum* and related genera (Robson, 1956) showed that the interrelationships of several species in this group have been misunderstood. In particular, while revising *Hypericum* for the " Flora Zambesiaca ", it has become clear that the interrelationships of herbaceous tropical and southern African species of this genus require clarification.

General Classification :—It has been shown (Robson, op. cit.) that the genus *Hypericum* can be divided into four main groups—a basic one comprising the Asiatic section *Norysca* (Spach) Endl. and the " genus " *Takasagoya* Kimura from Formosa and the Philippines, and three derivatives which were called the Articulate, Boreal and Austral groups respectively. Each of the last three groups is represented in tropical Africa, while *H. mysorense* Wight & Arn. (Sect. *Norysca*) occurs in Socotra.

The Articulate Group :—This group consists almost entirely of shrubs from S.W. Asia, Africa, the Mediterranean region and northern America, most of which have articulations where the leaf joins the stem. In tropical Africa it is represented by Sect. *Campylosporus* (Spach) Endl., shrubs or small trees with isomerous, pentamerous flowers, distinct stamen fascicles, petals and stamen fascicles persistent after flowering, and the styles more or less fused together. *H. socotranum* R. Good, a species endemic to Socotra, is atypical in having completely free styles. There are two specimens in the Kew Herbarium from the African mainland which resemble *H. socotranum* very closely, but differ in having their styles completely fused together. This plant is described below as a new species.

H. synstylum *N. Robson*, sp. nov. affinis *H. socotrano* R. Good sed stylis omnino conjunctibus differt.

Frutex diffusus, 2–3 m. altus ; caules juvenes complanati-quadrilineati aut teretes, deinde teretes. *Folia* breviter petiolata, petiolo usque ad 1 mm. longo plus minusve articulato ; lamina oblonga vel oblongo-ovata, 10–20 mm. longa et 5–10 (rarius usque ad 12) mm. lata, apice rotundata vel obtusa raro acuta plus minusve apiculata, basi rotundata vel late cuneata, nervatione pinnata aut laxe reticulata nervis lateralibus ad apicem inflectis, glandulis pellucidis punctata vel breviter striata, haud nigro-punctata. *Flores* solitarii vel 2–3-nati ramos terminantes. *Sepala* lineari-lanceolata, integra, usque ad 7 mm. longa et 2 mm. lata, apice acuta vel acuminata, glandulis pellucidis striata vel lineata, haud nigro-punctata. *Petala* flava, 13–16 mm. longa, glandulis pellucidis numerosis lineata, post anthesin persistentia. *Staminorum* fasciculi 5, 15–20-staminati, post anthesin persistentes ; filamenta 7–10 mm. longa, basi breviter connata ; antherae c. 0·5 mm. longae, connectivo haud glandulifero. *Ovarium* ovoideum, 2 mm. diam., 5-lobatum, 5-loculare ; styli 5 mm. omnino conjuncti, stigmatibus parvis. Capsula matura adhuc non visa.

Br. Somaliland : Gan Libah, Golis Range, 9.vii.1945, " Relic on inaccessible overhanging rock. Grazed by goats ". *P. E. Glover & Gilliland* 1168 (K, holotype).

Ethiopia : Harar Prov., Mt. Achim. 14.x.1954, " Between limestone rocks on black soil, 7000 ft." *P. R. O. Bally.* B.10057 (K).

This species is closely allied to *H. socotranum* Good, but can be easily distinguished by the completely fused styles and rather broader leaves. It differs from *H. lanceolatum* Lam. by the same characters, while the number of styles also distinguishes it from the other two Socotran endemic species, *H. scopulorum* Balf. f. and *H. tortuosum* Balf. f. The leaves of *H. gnidiifolium* A. Rich. are longer and narrower than those of *H. synstylum* and the styles are incompletely united.

The Boreal Group :—This is mainly a northern temperate group whose species extend south to Mexico in the west and to Sumatra in the east. Its members are all herbs with flowers in which the stamen fascicles are nearly always distinct, either 5 separate, 4 (= 2 + 1 + 1 + 1) or 3 (= 2 + 2 + 1), and the styles are nearly always free. The placentation is usually axile. As in the Austral group, the petals and stamens are persistent after flowering and the leaves are not articulated at the base. With two exceptions, all the *Hypericum* species with an indumentum belong to this group.

There are only two members of the Boreal Group in tropical Africa—*H. annulatum* Moris (=*H. intermedium* Steud. ex A. Rich.), a plant of upland grassland from Eritrea and Ethiopia to N. Tanganyika, and *H. afromontanum* Bullock which is closely related and endemic to Mt. Elgon. *H. annulatum* also occurs in Sardinia, a distribution which is less surprising than it might seem because the section to which these two species belong, Sect. *Montana* Stefanoff (= Sect. *Euhypericum* Boiss., p.p.), is centred in the Mediterranean region. *H. perforatum* L., another member of the Boreal Group, occurs as a native on Jebel Marra (Sudan) and has been introduced into South Africa.

The Austral Group :—The remaining African species of *Hypericum* belong to a group which has a predominantly southern distribution—N. and S. America, Africa south of the Sahara, India and Ceylon, tropical and temperate E. Asia, Australia, New Caledonia and New Zealand. There appear to be no native species of this group in Europe or W. Asia, although one or two N. American species have been found from time to time in Europe, probably introduced by birds.

The species in this group vary from shrubs to annual herbs. Their styles are always free, but they can be distinguished from the Boreal Group by the stamen fascicles which tend to merge together to produce a pesudo-polyandrous flower. The group comprises two sections, Sect. *Brathys* (Mutis. ex Linn. f.) Choisy, whose species have parietal placentation, and Sect. *Humifusoideum* R. Keller emend. N. Robson,* in which the placentation is axile. Sect. *Brathys* is further divided into two subsections, Subsect. *Brathys* which contains low shrubs with short internodes and thick leaves, and Subsect. *Spachium* R. Keller, containing mainly herbaceous species with long internodes and unthickened leaves. Subsect. *Brathys* occurs in New Guinea and tropical America, while Subsect. *Spachium* has the distribution of the whole group; and Sect. *Humifusoideum* is found in the E. Indies, Africa south of the Sahara and Central America. The table below gives the characters of the last two taxa :—

* See p. 436.

Table 1

CHARACTERS OF SECT. HUMIFUSOIDEUM AND SECT. BRATHYS SUBSECT. SPACHIUM

	Sect. *Humifusoideum*	Sect. *Brathys* Subsect. *Spachium*
Stem ...	Terete, rarely ± 2-lined above. (1)	Quadrangular or 4-winged
Dark glands ...	Present on leaves, sepals, petals and sometimes on stems and anthers	Completely absent from all parts of the plant. (2)
Pale glands ...	Usually large and conspicuous, often yellowish	Usually small and inconspicuous
Petals ...	Pale- to golden-yellow, with or without red tinges	Golden-, apricot- or orange-yellow, with or without red tinges or veins
Placentation ...	Axile	Parietal
Stigmas ...	± Capitate	Broadly capitate or peltate
Fruit ...	Capsular, rarely baccate	Capsular
Marking on Testa	Rows of laterally elongated pits	Vertical ridges with transverse striae between them

(1) In some very small specimens of *H. peplidifolium* A. Rich. from the Virunga Mts., Uganda, the stems are somewhat 4-angled in the upper parts.

(2) According to Keller (1908), certain American members of this subsection have dark glands on the stem and leaves, e.g. *H. melanostictum* R. Keller. I have not been able to see specimens of these species ; but elsewhere Keller has mistaken the darkened pellucid glands on old specimens for true dark glands (see below), and so he may have been similarly mistaken in this case.

SECT. BRATHYS SUBSECT. SPACHIUM :—The distribution of this subsection is centred in S. America, from which two evolutionary lines may be traced. One of these proceeds eastward, comprises erect herbs with acute sepals and narrow acute leaves, and is represented in Africa by the variable *H. lalandii* Choisy which also occurs in the E. Himalayas. *H. gramineum* Forst., from Australia, New Zealand and New Caledonia, appears to be hardly distinguishable from *H. lalandii*, while other specimens of this African species can be matched by some American species, e.g. *H. pauciflorum* Kunth from Mexico. Some small decumbent forms of *H. lalandii* have obtuse sepals and are superficially similar to members of the other evolutionary line, e.g. *H. scioanum* Chiov. ; but the upper leaves are always narrow.

The other evolutionary line in this subsection can be traced from N. America in a western direction, and is represented in the Eastern Hemisphere mainly by the variable *H. japonicum* Thunb. The species in this series are decumbent to prostrate in habit, and the sepals and leaves are broad and obtuse. Plants referred to *H. japonicum* occur in tropical and temperate E. Asia, Australasia, India and Ceylon. A Madagascar plant

has been placed in a separate subspecies, *H. japonicum* subsp. *pseudocrispum* R. Keller, but it can be matched exactly by specimens from India and Ceylon. Other Madagascar specimens are indistinguishable from *H. humbertii* Staner, a plant of the Belgian Congo and Uganda, while the closely related *H. scioanum* Chiov. from the E. African mountains appears to be the same as some specimens which Perrier de la Bâthie (1951) has included in *H. japonicum* subsp. *pseudocrispum*. However, the Madagascar plants are said to grow in drier habitats than the rest of the species in this series. *H. oligandrum* Milne-Redh. from N.W. Rhodesia belongs to this circle of affinity, but can be distinguished from the other species by the number of its styles (5 or 4). It is also geographically separated from them.

Sect. Humifusoideum :—Up to the present, Sect. *Humifusoideum* has comprised only two species, *H. peplidifolium* A. Rich. from tropical Africa and *H. natalense* Wood & Evans from Natal and Cape Province. All the remaining African species of *Hypericum*, however, should be included in this section, as well as some species from the E. Indies and two from Central America (see Robson, 1956). Keller's diagnostic characters for this section—" three " stamen fascicles and five carpels—apply only to certain forms of *H. peplidifolium* and *H. natalense* and not at all to the other species, and so the characters and limits of the section require to be redefined.

Hypericum L. sect. *Humifusoideum* R. Keller emend. N. Robson.

Frutices vel herbae glabri ; caules teretes aut bilineati, raro plus minusve quadranguli. Glandulae nigrae in foliis sepalis petalisque plerumque interdum etiam in caulibus antherisque adsunt. Glandulae pellucidae plerumque magnae, saepe prominentes subflavaeque. *Petala* staminaque post anthesin persistentia. *Stamina* plerumque basi inaequaliter coalita, raro in fasciculis 3–5 inserta. *Ovarium* 3–5-loculare, placentis centralibus ; styli 3–5, liberi ; stigmata plus minusve capitata. *Fructus* plerumque capsularis, raro indehiscens. *Semina* cylindrica, nec alata nec carinata, scalariformi-reticulata vel -foveolata.

Sect. *Humifusoideum* is related to Sects. *Brathys* and *Norysca*. It differs from Sect. *Brathys* by the axile placentation and the presence of dark glands on various parts of the plant, among other characters. (*H. pulogense* Merrill, from the Philippines, is exceptional in having no dark glands). From Sect. *Norysca* it is distinguished by the persistent petals and stamens, by the varying number of carpels, and by the usually irregular arrangement of the stamens. Members of Sect. *Humifusoideum* can usually be distinguished from Sect. *Euhypericum* sensu R. Keller (i.e. species in the Articulate and Boreal Series which have " three " stamen fascicles and three carpels) by the irregular arrangement of the stamens and by the varying number of carpels. Furthermore, they are always glabrous and the sepals are usually entire.

The following is a key to the African species of Sect. *Humifusoideum* :

Sepals acute, subequal ; styles 3 (4) ; shrubs or erect herbs :

Petals (except round the margin) unspotted, or spotted with faint reddish or orange glands ; stems usually branched, more rarely erect and unbranched :

Leaves small (6–18 mm. long), shortly petiolate, cuneate or rounded at the base, rarely slightly cordate ; shrub or shrublet *H. kiboense*

Leaves larger (15–25 mm. long), sessile, ± stem-clasping, rounded to cordate at the base ; slender shrub or erect woody herb *H. conjunctum*

Petals spotted or streaked with blackish glands ; stems usually erect and unbranched from the base . . . . . *H. aethiopicum*

Stems eglandular ; sepal marginal glands usually ± protruding subsp. *aethiopicum*

Stems usually ± covered with dark glands ; sepal marginal glands usually sessile . . . . . subsp. *sonderi*

Sepals obtuse or rounded, unequal ; styles (3) 4–5 ; erect or, more frequently, ± decumbent or prostrate herbs :

Fruits capsular, usually erect ; styles 3–4 (5) :

Stems erect, stout, 30–40 cm. high ; leaves 15–20 mm. long, sessile (rarely shortly petiolate) . . . . . *H. natalense*

Stems ± procumbent, slender ; leaves 3–15 mm. long, shortly petiolate (rarely almost sessile) . . . . . *H. wilmsii*

Fruits baccate, on reflexed pedicels ; styles 4–5 ; stems usually prostrate or ascending . . . . . *H. peplidifolium*

H. kiboense Oliv. in Trans. Linn. Soc., ser. 2, Bot. **2** : 329 (1887). This is a small, much-branched shrub which has been recorded as yet only from the mountains of East Africa. According to Milne-Redhead (1953), it reaches a height of 2·4 m. On the other hand, some specimens from Mt. Elgon and various Tanganyikan localities do not exceed 2 ft. (60 cm.). A specimen in the British Museum Herbarium from Angola* differs from these small E. African plants only in height (40 cm.) and so should be included in *H. kiboense* despite the wide disjunction in distribution. (Map 1).

H. conjunctum *N. Robson*, sp. nov. affinis *H. kiboensi* Oliv., sed foliis majoribus saepe semiamplexicaulibus differt.

Frutex gracilis vel herba perennis, 30 cm. altus vel altior ; caules teretes, erecti vel aliquantum ascendentes, plus minusve decorticantes. *Folia* sessilia, oblongo-ovata vel late ovata, (15) 20–30 mm. longa et 6–12 (–17) mm. lata, apice rotundata vel retusa, basi rotundata vel cordato-amplexicaulia, marginem versus plus minusve undulata, venatione reticulata, glanduloso-punctata punctis pellucidis subflavis numerosis prominentibus, punctis nigris intramarginalibus. *Flores* numerosi, cymis corymbosis densiusculis. *Sepala* lanceolata vel linearia, usque ad 6 mm. longa et 1·75 mm. lata, apice acuta vel acuminata, glandulis pellucidis longitudinaliter striata vel lineata, margine glandulis nigris

* Huila : Near Posto Zootechnico, near Humpata, c. 2000 m., 21.vi.1937, *Exell & Mendonça*, 2995 A.

sessilibus vel prominentibus punctata. *Petala* flava rubrotincta, c. 9 mm. longa, margine glandulis nigris punctata. *Stamina* c. 80, basi inaequaliter coalita vel incerte 3-fasciculata, antherarum connectivis nigro-glandulosis. *Ovarium* conicum vel ovoideum, c. 1·5 mm. diam., 3-loculare ; styli 3, patuli, stigmatibus plus minusve capitatis. *Capsula* ovoidea, 3–4 mm. diam., valvis longitudinaliter resino-striatis ; semina cylindrica, viridi-fusca, c. 0·75 mm. longa, scalariformi-foveolata.

Kenya : Masai Distr. " Dry bush north of Narok " *J. C. Rammell.* Forest Dept. 3492 (K).

Tanganyika : S. Highlands Prov., Njombe Distr., Mdapo, iii.1954, *Semsei* 1643 (K, holotype ; PRE) ; Mt. Mbeya, 2550 m., iv. 1938, " Open grass country ", *A. J. Maclunes* 241 (BM) ; Upper Kiwiri R., Poroto Mts. nr. Mbeya, 1950 m., v. 1938, " Dry sunny places ", *D. Maclunes* 415 (BM) ; Lower slopes of Poroto Mts., Mbeya, 1950 m., 18.ii. 1934, " In grassland ", *A. P. J. Michelmore* 964 (K) ; " Mountains E. of Lake Nyasa, N.(orth) E.(nd) low down ", *Rev. W. P. Johnson* (K) ; Njombe Distr., Matamba, 1800 m., 8.i.1957, " Among grass on side of road ", *Richards* 7593 (K). (Map 1).

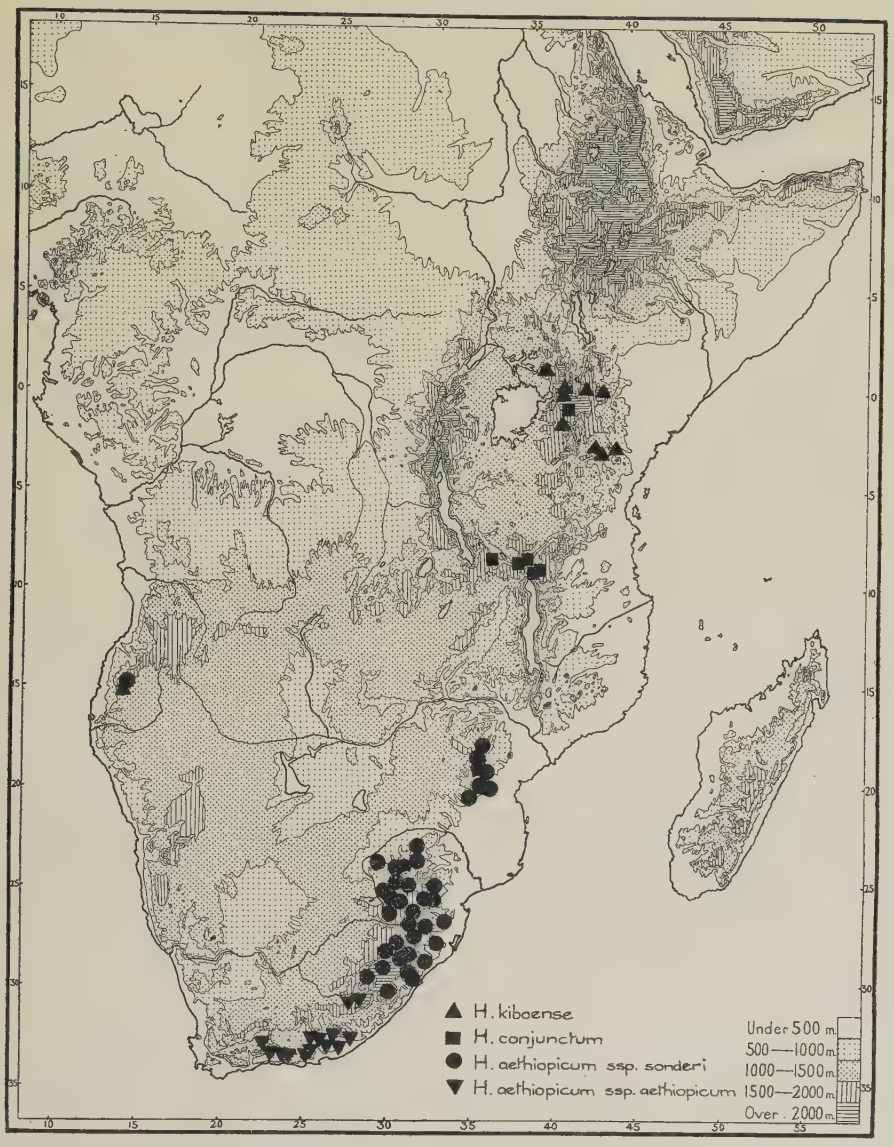
H. conjunctum is intermediate between *H. kiboense* on the one hand and *H. aethiopicum* on the other. Milne-Redhead (l.c.) called two E. African Hyperica " Sp. A " and " Sp. B " respectively, because he felt that the available specimens were not complete enough to make a full description. Since that time more material has been collected, but the relevant information is still less complete than one would wish. " Species A " appears to be a slender shrub while " Species B " is more herbaceous ; but apart from the habit the two plants are very similar. When one considers the variation in height and habit in *H. kiboense*, it seems advisable to include both forms in the same species.

H. conjunctum resembles *H. kiboense* in having black glands round the margins only of the petals, although reddish or orange spots may occur over the surface, and the cortex tends to flake off ; it resembles *H. aethiopicum* in having amplexicaul leaves, and is intermediate between these species in habit and condensation of the inflorescence. *Volkens* 1886, which Milne-Redhead (l.c.) mentioned as atypical for *H. kiboense*, has an inflorescence similar to that of *H. conjunctum* and the leaves are broader than is usual in *H. kiboense* ; but the leaves are cuneate at the base and shortly petiolate, so that this specimen can be retained in *H. kiboense*.

H. aethiopicum Thunb., Prodr. Pl. Cap. : 138 (1800). Bredell (1939) pointed out that two separate plants have been included in this species. The typical one is confined to Cape Province, where it occurs mostly in the extreme south (Map 1). It has eglandular stems and the dark marginal glands of the bracts and sepals protrude to form a fringe. On the other hand the second plant, which Bredell named *H. sonderi*, has gland-dotted stems and the bract and sepal margins are entire. It has a much wider distribution than the typical plant (in the Orange Free State, Basutoland, Natal, Swaziland, Transvaal, Mozambique, S. Rhodesia (E. Highlands) and Angola (Huila)), and its area overlaps that of the typical plant in N.E. Cape Province (Map 1).

However, a detailed examination of all the available material showed that the two plants are not as distinct as Bredell suggested. Several specimens from Natal, Transvaal and S. Rhodesia were found to have stems which were eglandular or almost so. Furthermore, in some specimens from the Cape region the sepals were only slightly glandular-

dentate, while in others from the Melsetter region of S. Rhodesia the glands protruded to form a narrow fringe round the sepal margin. On account of this incomplete correlation between the stem and sepal



Map 1

characters, it seems more appropriate to treat these two plants as subspecies rather than species :—

H. aethiopicum Thunb. l.c. subsp. **aethiopicum.**—*H. aethiopicum* Bredell l.c. et auct.

Stems eglandular, sepals and bracts ± gland-fringed.

H. aethiopicum Thunb. subsp. **sonderi** (Bredell) stat. nov.—*H. sonderi* Bredell l.c. ; *H. aethiopicum* var. *glaucescens* Sonder in Fl. Cap. **1** : 118 (1859–60) ; *H. aethiopicum* auct. mult.

Stems usually gland-dotted, sepals and bracts usually entire. Lectotype : Natal, " In planitie pr. Camperdown ", 900 m., fl. 17.ix.1893, *Schlechter* 3270 (K, holotype ; PRE).

All the species of Sect. *Humifusoideum* are variable and tend to produce forms having some of the characters of related species. Hence it does not seem necessary to uphold Bredell's *H. sonderi* var. *transvaalense*, although Mogg 13996, one of the specimens cited by Bredell, resembles *H. natalense* in leaf-form and texture. This resemblance is not likely to be due to recent hybridisation, for *H. natalense* has not been recorded from the Transvaal.

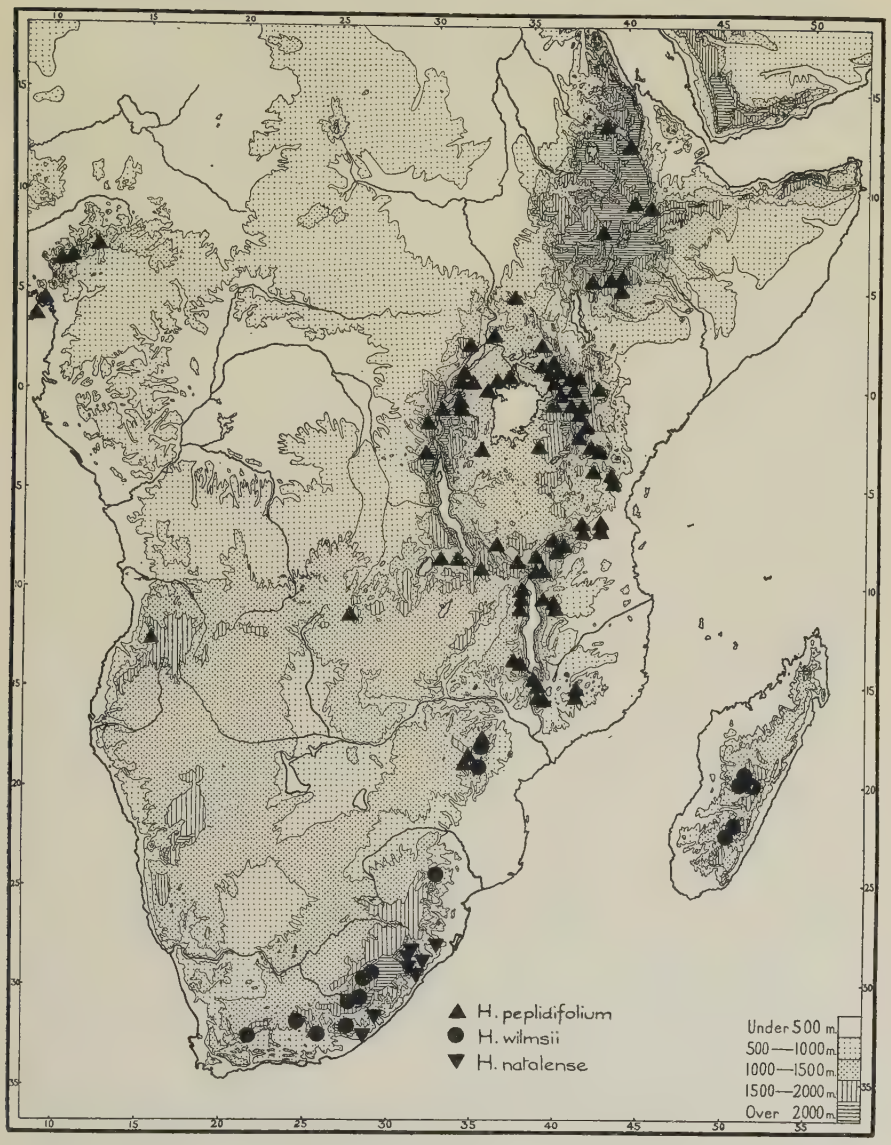
The distribution of forms of Sect. *Humifusoideum* species with gland-dotted stems is worthy of note. These appear to be restricted to the region between S.W. Tanganyika, N. Rhodesia, Nyasaland and the north-east of Cape Province. The northern parts of the areas of *H. aethiopicum* and *H. wilmsii* fall within this region, as does the southern part of the area of *H. peplidifolium* ; and all these species have forms with gland-dotted stems in this region and forms with eglandular stems elsewhere. *H. natalense*, whose area of distribution only reaches the extreme south of this region, has eglandular stems, while the remaining African species of Sect. *Humifusoideum* are restricted to areas to the north of it. (The Angolan specimen of *H. kiboense* has eglandular stems, like the rest of that species). It seems possible that the occurrence of gland-dotted stems may be due to a mutant gene which has spread through the populations in the Rhodesia–Nyasaland area only.

H. natalense Wood & Evans in Journ. of Bot. **35** : 487 (1897).—*H. woodii* R. Keller in Engl. Bot. Jahrb. **58** : 193 (1923). This species and the two subsequent ones comprise a homogeneous group which is easily distinguished from the other African members of this section by the form of the sepals. The species themselves are very variable, but *H. natalense* can usually be recognised by its erect habit and sessile leaves (except in var. *petiolatum* Bredell). It is confined to the eastern regions of S. Africa (Natal and eastern Cape Province), nearer the coast than the other two species which are upland plants. (Map 2).

H. wilmsii R. Keller in Bull. Herb. Boiss., sér. 2, **8** : 179 (1908), in clav.—*H. rupestre* sensu Perrier in Arch. Bot., Bull. Mens. **1** : 9 (1927), non Jaub. & Spach nec Bojer mss. ; *H. nigropunctatum* Norlindh in Bot. Notis. **1934** ; 103 (1934) ; *H. bojerianum* Perr., Fl. Madag., Hypéric. : 4 (1951) excl. syn., non *H. bojerianum* Perr. in Notul. Syst. **13** : 269 (1949). *H. wilmsii* differs from *H. natalense* by its decumbent habit, more slender and usually shorter stems and shortly petiolate leaves. Some S. Rhodesian specimens approach *H. peplidifolium* in having pedicels more or less reflexed in fruit, but their fruits are always capsular and the styles are 3 or 4 in number, never 5.

H. wilmsii comprises three geographically separate populations, which up to the present have been regarded as distinct species (Map 2). The

type locality is near Lydenburg, Transvaal (*Wilms* 136), and it also occurs in the Utrecht District (N.W. Natal) (fide Bredell, 1939, map), Basutoland and scattered localities in central and eastern Cape Province. *H. nigropunctatum* is a species of the Umtali and Inyanga districts of S.



Map 2

Rhodesia. A study of material of both species, however, including the type specimen of *H. nigropunctatum* (*Fries, Norlindh & Weimarck* 3634) and a fragment of the type of *H. wilmsii* in Pretoria Herbarium, revealed similar variations in stem length and leaf shape, from long prostrate stems with oblanceolate leaves to shorter decumbent stems with almost orbicular leaves ; and so there is no doubt that these two taxa are conspecific.

The third population, from the Central Highlands of Madagascar, is not so variable as the other two. The number of styles is consistently 4, and the leaves are usually more orbicular than those of the mainland plants. However, a comparison of material in the Paris Herbarium (Perrier de la Bâthie 3567, 3478, 3663, 12987 and 14625) with specimens from S. Rhodesia and S. Africa showed that the Madagascar plants could be matched by some from the mainland. Therefore, although the average leaf-shape is slightly different in Madagascar and continental Africa, this can be attributed to the restricted variation in the small Madagascar population and there is no valid reason for maintaining the latter as a separate species.

The nomenclature of the Madagascar plants requires some clarification as a result of confusion with *H. japonicum* Thunb. Keller (1908) described *H. japonicum* var. *rupestre*, citing a specimen from Emirna collected by Bojer. As a synonym he quoted " *H. rupestre* Bojer II, 32 ". This plant is said to have prostrate to ascending stems and black glands on the stem, leaves and sepals.

Perrier de la Bâthie (1927) pointed out that there had been confusion between two plants with prostrate or ascending stems, one of which had terete stems and dark glands round the leaves, sepals and petals, while the other had square stems and no dark glands. The latter he correctly referred to *H. japonicum* var. *pseudocrispum* R. Keller, but he took the former to be Keller's *H. japonicum* var. *rupestre*. As it did not appear to be related to *H. japonicum* he called it *H. rupestre* Bojer, but cited no specimens other than his own. At a later date he realised that this was a later homonym of *H. rupestre* Jaub. & Spach, a Cilician plant, and named the Madagascar one *H. bojerianum* (Perrier de la Bâthie, 1949). This was simply a name change, as he quoted *H. rupestre* Bojer and *H. japonicum* var. *rupestre* R. Keller but did not cite any specimens. His account of the genus in the Flora of Madagascar (Perrier de la Bâthie, 1951) included the same synonymy and a full description in French of the plant with terete stems and dark glands on leaves, sepals and petals, but again he cited only his own specimens.

A specimen in the Kew Herbarium bears the label " Hypericum rupestre nob. Hab. ad ripas in provinc. Emirna ", and would therefore appear to be at least an isotype of *H. rupestre* Bojer. However, it is a specimen of *H. japonicum* subsp. *pseudocrispum* (R. Keller) Perr. forma *paludicolum* Perr. with the usual square stem of Subsect. *Spachium* and no dark glands. The name does not seem to have been validly published, because Keller's citation is apparently the first time the name *H. rupestre* Bojer appeared in print. (Keller's reference to "II,32 " may indicate one of Bojer's collecting trips in Madagascar, as no trace of it can be found in any of his publications). I have not seen any material from Vienna, where Bojer sent most of his specimens. Keller's *H. japonicum* var. *rupestre* also has a square stem (see Keller, 1925), and so it is likely that the specimen which he saw and the one at Kew belong to the same taxon, viz. *H. japonicum* subsp. *pseudocrispum* f. *paludicolum*. In the same paper (Keller, 1908) he described a var. *madagascariense* of *H. lalandii* which was said to have dark glands ; but Perrier de la Bâthie (1949) has pointed out that, in fact, no plants of this species have dark glands. The pellucid glands often darken with age, and these were what

Keller described as black dots. It seems that he made the same mistake in describing *H. japonicum* var. *rupestre*.

From the foregoing account it will be seen that the Madagascar plant belonging to Sect. *Humifusoideum* has not yet been given a valid name, since *H. bojerianum* Perr. is a synonym of *H. japonicum* subsp. *pseudocrispum* f. *paludicolum*. It has been described twice in French (Perrier de la Bâthie 1927, 1951), but never in Latin. I consider it to be the same plant as *H. wilmsii* R. Keller and *H. nigropunctatum Norlindh*, in which case *H. wilmsii* is the earliest name for the whole species. On the other hand, if some future author decides to maintain it as a separate taxon, a Latin diagnosis will have to be provided.

H. peplidifolium A. Rich., Tent. Fl. Abyss. **1** : 95 (1847). This variable species differs from all others in Sect. *Humifusoideum* in having succulent fruits borne on reflexed pedicels. The presence of 5 styles in most flowers also distinguishes it from the other African members of this section except some forms of *H. natalense*. Pentamery in the gynaecium is considered to be a derived condition among the African members of Sect. *Humifusoideum* (see Robson, 1956), so *H. peplidifolium* can be regarded as the most highly evolved species in that group.

The most robust specimens of *H. peplidifolium* are found in Nyasaland, the Rhodesias and Mozambique, near the south-east boundary of its range (Map 2). These have been called var. *robustum* Bak. f., but there is no morphological disjunction between these forms and the typical ones. The northernmost plants of *H. wilmsii* and *H. aethiopicum* subsp. *sonderi* also occur in this area, and so there may be some gene interchange between these three plants in S. Rhodesia, because in each taxon there are some specimens which show resemblances to those of the other two,

A specimen from Rungwe, S.W. Tanganyika (*Geilinger* 2180) has flowers and fruits like those of *H. peplidifolium*, but the stem is stout and the leaves are sessile as in *H. natalense*. Milne-Redhead (l.c.), who thought it might be a new species, called it " Species C " because the material was inadequate to draw up a full description. However, a further specimen has been gathered in the same region (Rungwe Distr., Poroto Mts., Ngozi, *Richards* 6526). It has a similar stout stem, but most of the leaves are shortly petiolate as in typical *H. peplidifolium*. In addition, Mrs. Richards describes it as a spreading prostrate plant, unlike the erect *H. natalense*. These specimens are not likely to be hybrids between *H. natalense* and *H. peplidifolium* because the nearest station for the former species is in northern Natal Therefore it seems advisable to treat them as a robust form of *H. peplidifolium*.

The African Species of Hypericum :—The list on pp. 444–5 contains all the species of Hypericum recorded from Africa south of the Sahara, Madagascar, the Mascarene Islands and Socotra. Names regarded as synonyms have been omitted.

Notes (see nos. 1–3 in Table 2) :—

(1) *H. schimperi* and *H. riparium* may be conspecific with *H. roeperanum*.

(2) Plants closely related to, or possibly conspecific with, *H. lalandii* occur in Central America and Australasia.

(3) These taxa require detailed comparison with *H. japonicum* Thunb. and related species from E. and S.E. Asia, Australasia and N. America. It appears that *H. japonicum* subsp. *pseudocrispum* includes specimens referable to *H. japonicum*, *H. scioanum* and *H. humbertii* respectively.

H. chrysostictum Webb, Frag. Fl. Aethiop. : 54 (1854), is omitted because the specimen has not been examined. The original description is inadequate to allow a decision to be made regarding its affinities ; but it is said to be an undershrub with three divaricate styles, which suggests that it belongs to either Sect. *Arthrophyllum* or Sect. *Humifusoideum*. Its locality is unknown.

Table 2

THE AFRICAN SPECIES OF HYPERICUM

Section	*Species*	*Distribution*
Norysca (Spach) Endl.	*H. mysorense* Wight & Arn.	Socotra ; S. India & Ceylon
Campylosporus (Spach) Endl.	*H. lanceolatum* Lam.	S.W. Arabia ; from Eritrea & Ethiopia to Cape Province ; Cameroons & Fernando Po ; Madagascar, Comoros & Réunion
	H. roeperanum Schimp. ex A. Rich.	Sudan to Transvaal, Belgian Congo & Angola
	H. schimperi Hochst. (1)	Ethiopia
	H. riparium A. Chev. (1)	Fr. Guinea to Fr. Cameroons
	H. quartinianum A. Rich.	Sudan & Ethiopia to Nyasaland, Mozambique & N. Rhodesia
	H. keniense Schweinf.	Kenya, Uganda, Tanganyika, Belgian Congo
	H. bequaertii De Wild.	Uganda & Belgian Congo (Ruwenzori)
	H. gnidiifolium A. Rich.	Ethiopia
	H. synstylum N. Robson	Br. Somaliland & Ethiopia
	H. socotranum R. Good	Socotra
Arthrophyllum Jaub. & Spach	*H. scopulorum* Balf. f.	Socotra
	H. tortuosum Balf. f.	Socotra
Montana Stef.	*H. annulatum* Moris.	Sardinia ; Eritrea & Ethiopia to N. Tanganyika
	H. afromontanum Bullock	Kenya & Uganda (Mt. Elgon)
Hypericum	*H. perforatum* L.	Sudan (Jebel Marra) ; N. Temperate regions

Section	*Species*	*Distribution*
Humifusoideum R. Keller emend. N. Robson	*H. kiboense* Oliv.	Kenya, Uganda, Tanganyika, Angola (Huila)
	H. conjunctum N. Robson	Kenya & Tanganyika
	H. aethiopicum Thunb. subsp. *aethiopicum*	Cape Province
	H. aethiopicum Thunb. subsp. *sonderi* (Bredell) N. Robson	S. Rhodesia & Mozambique to N.E. Cape Province ; Angola (Huila)
	H. natalense Wood & Evans	Natal & E. Cape Province
	H. wilmsii R. Keller	S. Rhodesia to Cape Province ; Madagascar
	H. peplidifolium A. Rich.	Ethiopia & Sudan to Mozambique, S. Rhodesia, N. Rhodesia & Angola ; Cameroons, Fernando Po
Brathys (Mutis ex Linn. f.) Choisy subsect. *Spachium* R. Keller	*H. lalandii* Choisy	Sudan to Cape Province, S.W. Africa & Angola ; Nigeria (Bauchi) ; Madagascar ; Bhutan, Khasia & S.W. Yunnan (2)
	H. japonicum Thunb. subsp. *pseudocrispum* (R. Keller) Perr.	Madagascar (3)
	H. humbertii Staner	Uganda & E. Belgian Congo (3)
	H. scioanum Chiov.	Ethiopia, Kenya, Uganda, Tanganyika, E. Belgian Congo (3)
	H. oligandrum Milne-Redh.	N. Rhodesia

Summary :—The relationships of the species of *Hypericum* from tropical and southern Africa, Madagascar and the Mascarenes are discussed in the light of a recent study of the whole genus (Robson, 1956). Two new species are described, *H. sonderi* Bredell is reduced to a subspecies of *H. aethiopicum* Thunb., and the circumscription of Sect. *Humifusoideum* R. Keller is enlarged.

Acknowledgements :—I am grateful to Messrs. A. W. Exell and E. Milne-Redhead, and to Dr. H. Wild, for constructive criticism of the manuscript of this paper ; and to Miss A. James and Mr. P. Taylor for help in the production of the maps. Thanks are also due to the directors of the following institutions for the loan of specimens :—British Museum (Nat. Hist.) ; Muséum National d'Histoire Naturelle, Paris ; Institute of Systematic Botany, University of Uppsala ; National Herbarium, Division of Botany, Pretoria ; Southern Rhodesia Government Herbarium, Salisbury.

Bibliography :—

Bredell, H. C. (1939). A Revision of the South African Species of *Hypericum*. Bothalia 3 : 571–82.

Keller, R. (1908). Zur Kenntnis der Sectio *Brathys* des Genus *Hypericum*. Bull. Herb. Boiss., sér. 2, 8 : 175–91.

——— (1925). *Hypericum*, in Engl. & Prantl, Nat. Pflanzenfam., Ed. 2, 21: 175–83.

Milne-Redhead, E. (1953). *Hypericaceae*, in Turrill & Milne-Redhead, Flora of Tropical East Africa. London.

Perrier de la Bâthie, H. (1927). Les *Hypericum* de la section *Spachium* R. Keller à Madagascar. Archiv. Bot., Bull. mens. 1 : 8–12.

——— (1949). Les Hypericacées de Madagascar et des Comores. Notul. Syst. 13 : 268–90.

——— (1951). Hypericacées, in Humbert, Flore de Madagascar et des Comores. Paris.

Robson, N. K. B. (1956). Studies in the Genus *Hypericum*. Unpub. Ph.D. Thesis, Edinburgh Univ.

Mycological Literature.*—Every mycologist who has occasion often to verify author citations or to track down obscure references to mycological or plant pathological literature must be familiar with Lindau & Sydow's monumental " Thesaurus " which indexes the whole of the relevant literature published up to the end of 1910. This great work sets a very high standard both of accuracy and comprehensiveness, few indeed are the obscure papers which eluded those painstaking German compilers. It is, then, with lively anticipation that one learns of the forthcoming supplement to the Thesaurus, covering the succeeding 20 years, prepared by Prof. Ciferri and now in course of publication by the lithoprint process. Only the first volume, including authors whose names begin with the letters A to D, is yet to hand but a preliminary inspection of its pages indicates that a serious effort has been made to maintain the high standard of its predecessor. The new work is perhaps not quite as complete, some degree of selection of items to be included appears to have been made. Thus a few of the very brief notes in the British Mycological Society's Transactions are not included, nor are most of the shorter notices in, for example, L'Amateur de Champignons. More surprising is an obvious lapse in indexing Butler's Researches on Fungi. Vol. II, 1922 is listed but Vol. III, 1924 has been overlooked.

Evidently, then, one cannot feel absolutely confident that a paper not traceable through the new Supplement was not published during the period in question. Nevertheless the bulk of the important literature is clearly here and this is therefore a reference book which no mycological Department or institution can afford to be without. Our hearty congratulations are due to Prof. Ciferri for his courage and public spirit in undertaking and so successfully carrying through this tedious but most valuable labour.

R. W. G. Dennis.

* G. Lindau & P. Sydow : Thesaurus literaturae mycologicae et lichenologicae, Supplementum 1911–1930, A–D by R. Ciferri. Renzo Cortina, Pavia, 1950. 689 pp. Lire 20,000 for the complete work.

THE MENISPERMACEAE OF MALAYSIA : II*.

L. L. Forman

This paper contains accounts of the genera *Limacia*, *Hypserpa* and *Pachygone*. Bentham, Hooker and Thomson considered *Hypserpa* as a synonym of *Limacia*, but nearly all subsequent authors have retained the two genera as distinct. *Limacia* differs from *Hypserpa* in having the sepals in distinct whorls of three, those of the inner whorl being valvate. In *Hypserpa* the sepals are all imbricate, irregular in number and not arranged in whorls.

Limacia is confined to Malaysia with the exception of one species which occurs in Malaysia and also in nearby regions of continental Asia. Since the non-Malaysian specimens of this genus which were examined were few in number, it was considered useful to quote them in addition to the Malaysian ones so as to complete the revision of this small genus.

The accounts of *Hypserpa* and *Pachygone* deal only with the Malaysian species of these genera. Where a species is also represented from other areas but by only a few gatherings, all available specimens have been cited since their exact localities outside Malaysia were regarded to be of special interest.

The abbreviations used are the same as those in the previous paper of this series. The sex of the specimens quoted is given where possible : ' fl. ' and ' fr. ' indicate ' flower ' and ' fruit ' respectively, ' ? fl. ' indicates a specimen with very young buds of which the sex was not determined.

Acknowledgements are due to the Directors of the following herbaria for kindly sending material on loan :—Herbarium Bogoriense ; Rijksherbarium, Leiden ; Laboratoire du Phanérogamie du Muséum National d'Histoire Naturelle, Paris. I am also grateful to the Keeper of the Dept. of Botany, British Museum, for the facilities available to me on my visits there.

Limacia *Loureiro*

Limacia *Lour* Fl. Cochinch. 620 (1790) ; Hook f. et Thoms., Fl. Ind. **1,** 187 (1855) *p.p.* ; Benth. in Benth. et Hook. f., Gen. Pl. **1,** 36 (1862) *p.p.* ; Miers, Contrib. Bot. **3,** 108 (1871) ; Diels in Engl. Pflanzenr. Menisp. 213 (1910) ; Ridl., Fl. Mal. Penin. **1,** 108 (1922).

Woody climbers. *Stems* with young growing tips sometimes tendrilliform. *Leaves* petiolate ; lamina ± elliptic, base 3- or 5–nerved, indumentum of unicellular hairs. *Inflorescences* axillary or supra-axillary, cymose or paniculate. *Male flowers* : sepals 6 (or 9), in whorls of 3, tomentose, inner whorl valvate and larger than outer whorl(s) ; petals 6, concave ; stamens 6, free ; rudimentary carpels 3 or none. *Female flowers* : sepals and petals similar to male ; carpels 3, tomentose, style reflexed, stigma entire ; staminodes 6 or none. *Drupes* subcompressed-obovoid with style scar near base ; endocarp laterally convex containing 2 large lateral cavities, dorsally bearing a raised longitudinal band, surface smooth or slightly rugose. *Seed* curved, albuminous.

Distribution. Lower Burma, Lower Siam, Indochina, Sumatra, Malaya, W. Borneo and Philippines (Mindanao).

---

* Continued from K.B. 1956, 41.

1. Leaf base 5-nerved, petals pubescent . . . . . 1. *blumei*

1. Leaf base 3-nerved, petals glabrous :

2. Inflorescence paniculate, lax, up to 16 cm. long ; fruits 14–16 mm. long . . . . . 2. *oblonga*

2. Inflorescence a peduncled congested cyme, less than 2 cm. long ; fruits 20–25 mm. long . . . . . 3. *scandens*

1. Limacia blumei (*Boerl.*) *Diels* in Engl. Pflanzenr. Menisp. 215 (1910) ; Backer, Schoolfl. Java 43 (1911). Merr. in Philipp. Journ. Sci. **7,** 266 (1912) ; Merr., Enum. Philipp. Fl. Pl. **2,** 148 (1923) ; Yamamoto in Journ. Soc. Trop. Agric. **16,** 99 (1944).

Cocculus blumei Boerl., Cat. Pl. Phan. Hort. Bog. Bogor **1,** 40 (1899). Type : Cult. Hort. Bogor XVI.D.7 (syns. BO !, K !).

Woody climber up to 15 m. or more high. *Branchlets* puberulous at first, later glabrescent. *Leaves* with petioles 2–5 cm. long, puberulous ; lamina ovate to elliptic-ovate, 10–26 cm. long, 5–16 cm. broad, apex acute with long mucronate acumen, base cuneate to rounded, 5-nerved ; lateral nerves 2–3 pairs, sparsely to moderately puberulous and very finely reticulate on both surfaces ; chartaceous. *Inflorescences* cymose, few flowered, 0·75–1·5 cm. long, puberulous. *Male flowers* cream on pedicels 1–2 mm. long : sepals 6 or 9, tomentose, outer 3 or 6 minute up to 0·75 mm. long, inner 3 elliptic, 2 mm. long, 1·25 mm. broad ; petals 6, tomentose, broadly elliptic, 1 mm. long ; stamens 6, sublinear, glabrous, 1·5 mm. long ; rudimentary carpels 3. *Female flowers* (from Ramos and Edaño 49144) : sepals and petals larger than in male ; carpels 3, obliquely subellipsoid, 2 mm. long, style elongate, grooved, staminodes 6, linear, 1 mm. long. *Drupes* unknown.

Notes. This species was described in 1899 from plants cultivated in the Botanic Gardens at Bogor. One of these plants, no. XVI.D.7, was still alive and strongly growing in 1956, when in May I collected male flowering material from it. The only wild locality known for this species is Mindanao in the Philippines. Merrill mentions two collections I have not seen : *Piper* 427 and *Weber s.n.*

Collections examined :

Philippines. Mindanao : Davao Prov., Mati ; Mar. (♀ fl.), *Ramos and Edaño* 49144 (K).

Cult. in Hort. Bogor, XVI.D.7 (♂) (BO, K).

2. Limacia oblonga *Hook. f. et Thoms.*, Fl. Ind. **1,** 189 (1855) ; Miq., Fl. Ind. Bat. **1** (2), 80 (1858) ; Miers, Contrib. Bot. **3,** 109 (1871) ; Hook. f. et Thoms. in Hook. f., Fl. Brit. Ind. **1,** 100 (1872) ; King in Journ. As. Soc. Bengal **58,** 382 (1889) ; Diels in Engl. Pflanzenr. Menisp. 214 (1910) ; Ridl., Fl. Mal. Penin. **1,** 109 (1922) ; Burkill et Henderson in Gard. Bull. Str. Settl. **3,** 344 (1925) ; Henderson in *l.c.* **4,** 220 (1928) ; Burkill, Dict. Econ. Prod. Mal. Penin. **2,** 1343 (1935). Type : Malaya, Penang, *G. Porter* Wall. Cat. 4963 (holo. K !).

[*Cocculus oblongus* Wall., Cat. no. 4963 (1831–2) *nom. nud.*].

Limacia distincta Miers, Contrib. Bot. **3,** 111 (1871). Types : Malaya, *Griffith s.n.* (syn. K !) ; *sine loco*, *Griffiths s.n.* (syn. K !).

Limacia inornata Miers, Contrib. Bot. **3,** 111 (1871). Type : Singapore, *Lobb s.n.* (holo. K !).

Limacia velutina Hook. f. et Thoms. var. *glabrescens* King in Journ. As. Soc. Bengal **58,** 383 (1889). Based on *Limacia distincta* Miers.

Woody climber up to about 10 m. high. *Branchlets*, petioles and inflorescences covered with a very short, velvety, ± yellow-brown indumentum. *Leaves* with petioles 1·5 4·0 cm. long ; lamina elliptic, oblong-elliptic, broadly elliptic or elliptic-obovate, 9–25 cm. long, 3–10 cm. broad, apex usually acutely acuminate, mucronulate, base acute to rounded, 3-nerved ; lateral nerves 4 pairs, prominent on lower surface ; both surfaces glabrous apart from puberulous mid-rib ; chartaceous. *Male inflorescences* paniculate, often about 3 arising together, 5–16 cm. long with very slender branches. *Male flowers* greenish yellow, subsessile : sepals 9, ± ovate, tomentose, outer 3 minute, 0·5 mm. long, middle 3, 0·75 mm. long, inner 3, 1·5 mm. long and broad ; petals 6, obovate 0·75 mm. long, glabrous ; stamens 6, claviform 0·75 mm. long. *Female inflorescences* similar to male but shorter, 1–4 cm. long, branches thickening when in fruit. *Female flowers*, sepals and petals ± as in male ; carpels 3, obliquely ellipsoidal, 1 mm. long, stigma auriculate ; staminodes linear. *Drupes* yellow on pedicels about 2 mm. long inserted about 8 mm. from style scar, obliquely obovate in outline, 14–16 mm. long, 12–13 mm. broad, 10–11 mm. thick, puberulous.

Distribution. W. Malaya from Penang to Singapore.

Habitat. In primary and secondary forests up to about 350 m. altitude.

Uses. Root extract applied to sore eyes ; possibly contains berberine (Burkill, 1935).

Vernacular Names. *Malaya* : akar china, akar kuning, akar kunyit-kunyit.

Collections examined :—

Malaya. Perak : Taiping ; Mar. (♂), *Burkill and Haniff* 13037 (BO). No locality; May (♀ fl.), *King's coll.* 6112 (BO). Larut ; Apr. (? fl.), *King's coll.* 11092 (BM). Goping ; May (♂), *Kunstler* 6184 (K). No locality ; (♀ fr.), *Scortechini* 36 (K). Selangor : Rawang ; Aug. (♀ fl.), *Kloss s.n.* (K). Kuala Lumpur ; (♂), *Ridley* 3970 (K). Negri Sembilan : Bukkit Tangga ; Dec. (♂), *Ridley s.n.* 1920 (K). Malacca : (♂, ♀ fl.), *Griffiths s.n.* (K). (♂, ♀ fr.), *Maingay* 1050 (119) (BM, K). Johore : Nam Heng ; (st.), *Sinclair* 40365 (BO, K, L). Penang : Government Hill ; Mar. (♂), *Curtis* 671 (BM, K). Apr. (♂), *King's coll.* 1575 (BO, K). (♂), *Phillips s.n.* 1824 (K). (? fl.) *G. Porter, Wall. Cat.* 4963 (K). Singapore : (♂), *Lobb* s.n. (K).

3. Limacia scandens *Lour.*, Fl. Cochinch. 620 (1790) ; Hook. f. et Thoms., Fl. Ind. 189 (1855) ; Miers, Contrib. Bot. **3,** 109 (1871) ; Diels in Engl. Pflanzenr. Menisp. 214 (1910) ; Merr. in Trans. Am. Phil. Soc. *n.s.* **24** (2), 157 (1935). Type : Cochinchina, *Loureiro s.n.* (? holo. BM !).

Cocculus limacia DC., Syst. **1,** 526 (1817). Based on *L. scandens* Lour.

Menispermum limacia (DC.) Spreng., Syst. **2,** 155 (1825). Based on *L. scandens* Lour.

[*Cocculus velutinus* Wall. Cat. 4970 (1831–2) *nom. nud.*]

Limacia velutina Hook. f. et Thoms., Fl. Ind. **1,** 189 (1855) ; Miq., Fl. Ind. Bat. **1** (2), 80 (1858) ; Miers, Contrib. Bot. **3,** 110 (1871) ; Hook. f. et Thoms. in Hook. f., Fl. Brit. Ind. **1,** 100 (1872) ; Beccari, Malesia **1,** 151 (1877) ; Kurz, For. Fl. Burma **1,** 55 (1877) ; Ridl. in Journ. Str. Br. Roy. As. Soc. **33,** 42 (1900) ; Gagnep. in Lecomte, Fl. Gén. Ind.-Ch. **1,** 144 (1908) ; Diels in Engl. Pflanzenr. Menisp. 215 (1910), et in Elm. Leafl. Philipp. Bot. **4,** 1165 (1911) ; Koord., Exk. Fl. Java **2,** 234 (1912) ; Ridl. Fl. Mal. Penin. **1,** 109 (1922) ; Merr., Enum., Philipp. Fl. Pl. **2,** 148 (1923) ; Norman in Journ. Bot. **62** (Suppl.) 5 (1924) ; Henderson in Gard. Bull. Str. Settl. **4,** 220 (1928) ; Yamamoto in Journ. Soc. Trop. Agric. **16,** 98 (1944) ; Henderson in Mal. Nat. Journ. **6,** 417, t. 378 (1951). Type : Singapore, *Wallich* 4970 (holo. K !).

Limacia cerasifera Becc., Malesia **1,** 150 (1877) ; Diels in Engl. Pflanzenr. Menisp. 215 (1910) ; Merr. Enum. Born. Pl. 249 (1921) *sphalm* '*cerasifolia*' ; Yamamoto in Journ. Soc. Trop. Agr. **16,** 98 (1944). [Type not seen].

Woody climber. Young branchlets, petioles and inflorescences yellowish to golden-brown (or rusty) tomentose, branchlets later glabrescent, young shoots sometimes tendrilliform. *Leaves* with petioles 1–3 cm. long ; lamina ovate-elliptic, elliptic or obovate-elliptic, 7–17 cm. long, 3–8 cm. broad, apex usually broad and abruptly cuspidate, or obtusely apiculate (occasionally long acuminate), base cuneate to rounded, trinerved ; lateral nerves 4–6 pairs ; both surfaces at first yellowish to golden-brown pubescent or tomentose, especially on lower surface along the nerves, later glabrescent ; stiffly chartaceous. *Inflorescences* composed of about 2–6 densely flowered cymes, 4–5 mm. across with peduncles (3–) 10–15 mm. long. *Male flowers* green to white, subsessile ; sepals 9, ovate, tomentose, outer 3, 1·0 mm. long, 0·75 mm. broad, middle 3, 1·25 mm. long, 1·0 mm. broad, inner 3, 2·5–3·25 mm. long, 1·75–2·5 mm. broad, thick ; petals 6, obovate, unguiculate, 1 mm. long, 0·75–1·0 mm. broad, glabrous ; stamens 6, claviform, 1 mm. long, filaments usually sparsely pilose adaxially. *Female flowers* : sepals and petals ± as in male, petals clasping linear staminodes ; carpels 3, ± obliquely ellipsoidal, 1·5 mm. long, 1·25 mm. broad, stigma auriculate. *Drupes* obliquely obovate in outline, pedicel about 3 mm. long inserted about 8 mm. from style scar, 20–25 mm. long, 16–20 mm. broad, 13–15 mm. thick, pubescent to glabrescent.

Distribution. In Malaysia : C. and S. Sumatra, W. Malaya from Penang to Singapore, Lingga Is., W. Borneo, S.W. Sarawak, (Philippines, *teste* Diels). Also in Lower Burma, Lower Siam, S. Cochinchina and Annam.

Habitat. Recorded from low altitudes (up to 150 m.) in open habitats and secondary growth. Common in Singapore and parts of Malaya.

Notes. The type species of *Limacia* Lour. is *L. scandens* Lour. and it is therefore necessary to determine with certainty the application of the latter name. It seems most unlikely that *L. scandens* is a distinct species

which has never (according to available evidence) been collected again since Loureiro's time. From the leaves of Loureiro's specimen, it would appear to be conspecific either with *L. oblonga* Hk. f. et Thoms. or *L. velutina* Hk. f. et Thoms. The differences between these two species lie mainly in their inflorescences, and it is just these organs which are so poorly represented in Loureiro's specimen, which was clearly more complete when Miers, Hooker and Thomson examined it.

Miers's description with measurements of the inflorescence must refer to parts of the specimen now missing. Hooker and Thomson considered that the specimen might represent an abnormal form of *L. oblonga*, although they admitted that the inflorescence was more like that of *L. velutina*. Loureiro in his original description described the male flowers as ' congesti ', which also indicates *L. velutina* rather than *L. oblonga*. The locality for *L. scandens* is given by Loureiro as ' Habitat in sylvis Cochinchinae ' ; it is noteworthy that *L. velutina* is known from this same region nowadays but *L. oblonga* has not been recorded outside Malaya. On the basis of this evidence, *L. scandens* is regarded here as conspecific with *L. velutina* and, being the older name, becomes the correct name for this species.

L. cerasifera Becc. was distinguished by Diels from *L. velutina* (here called *L. scandens*) by glabrous filaments in the former contrasting with pilose filaments in the latter. The filaments of *L. scandens*, however, are not invariably pilose : they are frequently subglabrous and occasionally glabrous. Since *L. cerasifera* appears to agree well in other respects with *L. scandens*, they are here considered as conspecific. (I have not seen the type of *L. cerasifera*).

Collections examined :—

Lower Burma : Mergui ; *Griffith* 832 (K). Tenasserim ; *Griffith* 1065 (K). *ibidem* ; *Helfer* 93 (BM). Moulmein ; *Lobb s.n.* (K).

Lower Siam : Pungat ; Dec. (♀ fl.), *Haniff and Nur* 4001 (BM, BO, K).

Indo-China : Cochinchina : *Loureiro s.n.* (BM). Prov. Bien Hoa, Mt. Songlu ; Mar. (♂, ♀ fr.) *Pierre* 1643 (BM, K). Annam : Blas ; Oct. (♀ fr.), *Poilane* 21178 (BO, K).

Sumatra. Rawas R., Muara Mengkulan ; (♀ fr.), *Forbes* 3044 (BM). Pangkalan ; Mar. (? fl.), *Koorders* 15765, 15766 (BO). No locality ; Mar. (♀ fr.), *Koorders* 22340 (BO). Lingga Is., Sungei Tanda ; (♀ fr.), *Teijsmann s.n.* (BO).

Malaya. Perak : Larut ; Nov. (♂), *King's coll.* 3558 (K). *ibidem* ; Aug. (? fl.), *King's coll.* 6484 (K). Kota ; (♀ fr.), *Wray* 2416 (K). Selangor : Kuala Lumpur ; May (♀ fr.), *Ridley* 3968 (BM). Malacca : Batu Tiga ; June (♀ fl.), *Derry* 1040 (K). Johore : Sungai Papan ; Mar. (♀ fr.), *Spare* 732 (K). Penang : Apr. (♂), *Curtis* 2296 (BM). Government Hill ; Feb. (♂), *Maingay* 2297 (K). *ibidem* ; (♂), *Ridley* 10182 (BM, K). Singapore : (♂) *Anderson* 16 (BM, K). Mandai ; Aug. (♂), *Burkill* 6104 (BO). (♂), *Cuming* 2402 (K). (♂), *Maingay* 2703 (120) (K). Chang ; Feb. (? fl.), *Ridley* 125 (BM). Chau Chu Kang ; (♀ fr.), *Ridley s.n.* 1895 (BO). Tanglin ; (♂), *Ridley s.n.* 1906 (BM). (♂), *Schomburgk* 49 (K). (st.), *Wallich* 4970 (K).

Borneo. W. Borneo : Between Mt. Klam and Djemela R. ; (♀ fl. fr.), *Hallier* 2553 (BO, K). Sarawak : Kuching ; (♀ fr.), *Hanada* BO2 (BO).

Hypserpa *Miers*

Hypserpa *Miers* [in Ann. Mag. Nat. Hist. II. **7,** 40 (1851) *nom. nud.*], *l.c.* III. **14,** 363 (1864), et Contrib. Bot. **3,** 100 (1871) ; Diels in Engl. Pflanzenr. Menisp. 205 (1910) ; Ridl., Fl. Mal. Penin. **1,** 111 (1922).

Selwynia F. v. M., Fragm. **4,** 153 (1864).

Scandent shrubs or woody climbers. *Stems* with young growing tips sometimes tendrilliform. *Leaves* petiolate ; lamina ± ovate to elliptic, base 3–7-nerved, indumentum of unicellular hairs or glabrous. *Inflorescence* axillary or supra-axillary, cymose or paniculate. *Male flowers* : sepals 7–12, not in whorls, glabrous or subglabrous, outer ones minute and bracteoliform, inner ones larger, imbricate ; petals 5–9, fleshy ; stamens 9–40, free or connate. *Female flowers* : sepals and petals similar to male ; carpels 2–3, styles solitary, reflexed, stigma entire. *Drupes* subcompressed-obovoid to -globose with style scar near base ; endocarp perforate or imperforate, surface rugose to rugulose. *Seed* curved, albuminous.

Distribution. China, S.E. Asia, Malaysia, Australia and Polynesia. 3 species occur in Malaysia ; 6 other species have been described from Australia and Polynesia.

1. Inflorescences glabrous . . . . . 1. *laurina*

1. Inflorescences hairy :

2. Leaves mostly 3-nerved ; stamens 9–10 (–14), free for most of their length . . . . . 2. *nitida*

2. Leaves mostly 5–7 nerved ; stamens about 20–40, connate 3. *polyandra*

1. Hypserpa laurina (*F. v. M.*) *Diels* in Engl. Pflanzenr. Menisp. 209 (1910).

Selwynia laurina F. v. M., Fragm. **4,** 153 (1864). Type : Australia, Rockingham Bay, *F. v. Mueller s.n.* (isos. BM !, BO !, K !).

Hypserpa selwynii F. v. M., Fragm. **9,** 82 (1875). Based on *Selwynia laurina* F. v. M.

Limacia selwynii (F. v. M.) Bailey, Queensl. Fl. **1,** 30 (1899).

Hypserpa parvifolia Kanehira et Hatusima in Bot. Mag. Tokyo **56,** 471 (1942). Type : West N. Guinea, Waren, *Kanehira et Hatusima* 12949 (syn. BO !).

Woody climbers, entirely glabrous (bracts and axillary buds sometimes puberulous). *Leaves* with petioles 1·0–1·5 (–3) cm. long ; lamina elliptic to oblong-elliptic, 7–12 cm. long, 3–4·5 cm. broad, apex obtuse, often minutely emarginate, base broadly cuneate to rounded, ± 5-nerved ; lateral nerves 2–3 pairs ; stiffly chartaceous. *Male inflorescences* paniculate, very lax, 4–15 (–20) cm. long, 1–4 (–9) cm. broad. *Male flowers* green or white on pedicels 1–5 mm. long : sepals 7–9, outer 2–3 about 1 mm. long, inner, 5–6 ± rotund, 1·5–2·0 mm. diameter ; petals (rarely 5–) 7–9, ± obtriangular 0·75–1·0 mm. long ; stamens 11–15, free (but with occasional connate pairs). *Female inflorescences and flowers* unknown ; [infructescence 6–8 cm. long, *teste* Diels]. *Drupes* red on pedicels about 5 mm. long, broadly obovate in outline, 12 mm. long, 9 mm. broad, 8 mm. thick. Endocarp dorsally obscurely rugose, laterally convex and smooth (from *Longman s.n.*, N. Queensland ; spm. in K !).

Distribution. S.W. Papua and Queensland.

Habitat. Recorded from rain-forest and fields of *Imperata cylindrica* (L.) Beauv. (' alang-alang ').

Collections examined :—

N. Guinea : West N. Guinea : Near Kp. Opeko (Topeko) ; Aug. (♂), *Anta* 252 (K, L). Waren ; Mar. (♂), *Kanehira et Hatusima* 12949 (BO). Papua : Lower Fly River ; Oct. (♂), *Brass* 7995 (BO, L). Tarara, Wassi Kussa River ; (♂), *Brass* 8736 (BO, L).

Australia. Queensland : Rockingham Bay ; (♂), *F. v. Mueller s.n.* (BO, K). Atherton Tableland, Lake Barrine ; Nov. (♂), *Kajewski* 1342 (K). N. Queensland ; (♀ fr.), *Longman s.n.* (K). Innisfail ; (♂), *Michael* 145 (BO).

2. Hypserpa nitida *Miers* in Hook. Kew Journ. Bot. **3,** 258 (1851) et Contrib. Bot. **3,** 102 (1871) ; Diels in Engl. Pflanzenr. Menisp. 210 (1910). Type : Hong Kong, *Champion s.n.* (holo. K !).

[*Coculus cuspidatus* Wall. Cat. no. 4960 (1831–2) *nom. nud.*].

Limacia cuspidata Hook. f. et Thoms., Fl. Ind. **1,** 189 (1855), et in Hook. f., Fl. Brit. Ind. **1,** 100 (1872) ; Scheffer in Nat. Tijdschr. Ned. Ind. **32,** 397, t. 8 (1873). Type : Syllet, *Wallich* 4960 (holo. K !, iso. BM !).

Limacia microphylla Miq., Fl. Ind. Bat. **Suppl. 1,** 386 (1861). Type : S. Sumatra, Lampongs, *Teijsmann s.n.* (holo. BO !, iso. K !).

Hypserpa cuspidata (Hook. f. et Thoms.) Miers in Ann. Mag. Nat. Hist. III. **14,** 365 (1864), et Contrib. Bot. **3,** 102, t. 108 (1871) ; Beccari, Malesia **1,** 149 (1877) ; Diels in Engl. Pflanzenr. Menisp. 206 (1910), et in Elmer, Leafl. Philipp. Bot. **4,** (1911) ; Merr., Enum. Born. Pl. 249 (1921) ; Ridley, Fl. Mal. Penin. **1,** 111 (1922) ; Merr., Enum. Philipp. Fl. Pl. **2,** 147 (1923) ; Burkill, Dict. Econ. Prod. Mal. Penin. 1219 (1935) ; Yamamoto in Journ. Soc. Trop. Agric. **16,** 97 (1944).

Limacia borneensis Miq., Ann. Mus. Lugd. Bat. **4,** 83 (1868). Types : Borneo, Mts. Sakumbang, Pamatta and Martapura (syns. K !, L !).

Hypserpa heteromera Miers [in Ann. Mag. Nat. Hist. III. **14,** 365 (1864) *nom. nud.*] et Contrib. Bot. **3,** 104 (1871) ; Diels in Engl. Pflanzenr. Menisp. 210 (1910); Merrill, Enum. Born. Pl. 249 (1921); Yamamoto in Journ. Soc. Trop. Agric. **16,** 98 (1944). Type : Borneo, Bandjarmasin, *Motley* 710 (holo. K !).

Hypserpa pauciflora Miers [*l.c.* 365 *nom. nud.*] et *l.c.* 105. Type : Ceylon, *Gardner s.n.* (holo. K !).

Hypserpa praevaricata Miers [*l.c.* 365 *nom. nud.*] et *l.c.* 103. Type : Philippines, *Cuming*, 1252 (syn. K !).

Hypserpa propensa Miers [*l.c.* 365 *nom. nud.*] et *l.c.* 105 ; Beccari, Malesia **1,** 149 (1877). Type : Borneo, Bandjarmasin, *Motley* 179 (holo. K !).

Hypserpa uniflora Miers [*l.c.* 365 *nom. nud.*] et *l.c.* 106. Type : Ceylon, *Walker s.n.* (holo. K !).

Hypserpa borneensis (Miq.) Beccari, Malesia **1,** 149 (1877).

Hypserpa cuspidata (Hook. f. et Thoms.) Miers *var. microphylla* (Miq.) Boerl., Cat. Pl. Bog. 39 (1899) ; Diels in Engl. Pflanzenr. Menisp. 207 (1910).

Hypserpa jagorii Diels in Engl. Pflanzenr. Menisp. 211 (1910) et in Elmer, Leafl. Philipp. Bot. **4,** 1165 (1911) ; Merrill, Enum. Philipp. Fl. Pl. **2,** 148 (1923). [Type not seen].

Hypserpa laevifolia Diels in *l.c.* 210 (1910). Type : Annam, *Pierre* 1968 (iso. K !, L !).

[*Hypserpa triflora* (non (DC.) Miers)—Miers in Ann. Mag. Nat. Hist. III. **14,** 365 (1864), et Contrib. Bot. **3,** 106 (1871), *pro parte non quoad Cocculus triflorus DC.* ; King in Journ. As. Soc. Bengal **58,** 384 (1889) ; Ridl. in Journ. Str. Br. Roy. As. Soc. **33,** 42 (1900).]

Scandent shrub. *Branchlets* sparsely to densely pubescent with yellowish hairs when young, later glabrescent. *Leaves* with petioles 0·8–2·0 cm. long, sparsely to densely pubescent ; lamina very variable in shape, lanceolate, lanceolate-elliptic, broadly elliptic or ovate (rarely narrowly oblong-elliptic), 4–12 cm. long, 1·5–7 cm. broad, apex obtusely (rarely acutely) acuminate or obtuse, usually mucronulate, base obtuse to rounded or truncate (rarely acute) 3-nerved (sometimes obscurely) ; main lateral nerves about 2 pairs, often indistinct ; both surfaces usually glabrous, sometimes pubescent (especially in Celebes and Philippines) ; chartaceous to subcoriaceous. *Inflorescences* cymose to paniculate, 1–4 (–12) cm. long, 0·5–1·5 (–2·5) cm. broad, yellowish pubescent. *Male flowers* yellow on pubescent pedicels 1–2 mm. long : sepals 7–11, outer ones minute and bracteoliform, subtriangular, scarcely 1 mm. long, puberulous outside, inner 4–5 ± ovate-rotund, 2·5 mm. long, 1·0–1·75 mm. broad, glabrous ; petals 5, obovate, about 1 mm. long ; stamens 9–10 (–14), connate at the base only, free above, 1·0–1·75 mm. long. *Female flowers* : sepals and petals as in male ; carpels 2 ± ellipsoid, scarcely 1 mm. long ; stigma plate-like. *Drupes* yellow to red on pedicels 1–4 mm. long, sub-globose, (5–) 6–8 mm. diam. Endocarp rugulose, sometimes perforate.

Distribution : In Malaysia : S. Sumatra, Malaya, Borneo, Philippines, Celebes. Also in Ceylon, N.E. Madras, Assam, Lower Burma, Thailand and Indo-China.

Habitat. Forests from sea level to 2000 m. altitude.

Vernacular Names. *Bangka* : akar sentjaw. *Malaya* : akar minjak. *N. Borneo* : borong, akar suganda.

Notes. The size, shape and degree of hairiness of the leaves of this species vary considerably. In general the leaves tend to be more hairy in Celebes and Philippines, while further west they are usually glabrous. The inflorescences are usually short (1–4 cm.) but they can become very long (up to 12 cm.) in Philippine specimens and in those from Celebes (e.g. *Kjellberg* 887). There are all intermediates between the small, glabrous leaved form with short inflorescences and the larger, glabrous or hairy leaved form with long inflorescences. It has therefore not been possible to maintain more than one species for the specimens quoted below ; nor has it been possible to recognise distinct infraspecific taxa.

When Hooker and Thomson described *Limacia cuspidata* they recognized that it was probably conspecific with *H. nitida*. Bentham treated the two names as conspecific in his Flora Hongkongensis p. 12 (1861). Diels, however, maintained *H. nitida*, distinguishing it from *H. cuspidata* by the allegedly more prominent nervation of the leaves in the latter species. I do not find this character at all useful in this instance. *H. laevifolia* Diels is also not distinguishable from *H. nitida*. The differences between these

two species as given by Diels in his key are largely contradicted in his descriptions.

Diels mentions, with some doubt, the possiblity that *Cocculus triflorus* DC., Syst. **1,** 529 (1817) may be conspecific with *Hypserpa cuspidata.* I have examined the type of *Cocculus triflorus* DC., which was collected by Commerson in Java (specimen in Herb. Paris) and found that it does not belong to *Hypserpa* at all but should be referred to *Cocculus sarmentosus* (Lour.) Diels.

Malaysian collections examined :—

Sumatra. Lampongs : near Mangala ; (♂), *Teijsmann s.n.* (holo. BO !, iso. K !). Bangka : no locality ; (♂), *Kobus s.n.* (BO). Lobok besar ; Sept. (♂), *Kostermans* 580 (K). Riouw Archip. : Pulan Tudjuh, Ranai ; May (♂), *Bünnemeijer* 6095 (BO).

Malaya. Pulau Jarajah ; Apr. (♂), *King's coll.* 4173 (K). Malacca : (♀ fl.), *Kurz s.n.* (BO). (♀ fl., fr. ♂), *Maingay* 1847 (123) (BM, K). Johore : Kangka Sedili Kechil ; June (♀ fr.), *Corner* 28573 (K). Langkawi Is. : Kuah ; Mar. (? fl.), *Ridley* 15164 (K). Penang : Pulau Bootong ; June (♀ fr.), *Curtis* 949 (K). Apr. (♂), *Curtis* 1558 (K). Telok Bahang ; Oct. (♀ fr.), *Sinclair* 39303 (BO, K, L). Singapore : (♂), *Cantley* 98 (K). Nov. (♂), *Ridley* 1849 (BM). Mar. (♀ fr.), *Ridley* 4736 (BM, K). Choa Chu Kang ; (♂), *Ridley s.n.* 1894 (BM). East side Pulau Seraya ; Dec. (♀ fl.), *Sinclair* 39130 (BO, L).

Borneo. Sarawak : (♀ fr.), *Beccari* PB3541 (K). Kuching ; (♀ fl.) *Hanada* BO11 (BO). Indonesian Borneo : Tikung ; Nov. (♂), *Amdjah* 869 (BO, K). Tepoh ; (♀ fr.), *Jaheri* 1667 (BO). Sungei Sambas ; (♂), *Hallier* 1102 (BO). Mts. Pamattan, Sakumbang and Martapura ; (♀ fr., ♂), *Korthals s.n.* (K, L). Mt. Beratus, Sula Mandau ; July (? fl.), *Kostermans* 7607 (BO). Bandjermasin ; (♂), *Motley* 179 (K). *ibidem* ; (♂), *Motley* 710 (K). N. Borneo : Penangsoo ; Apr. (♂), *BNB* (*Apostol*) 7104 (K). Sabah, Bongawan ; Nov. (♀ fr.), *BNB* (*Pingkun*) 10140 (K). Sabah, Kimanis ; May (♂), *BNB* (*Rahim*) A492 (K). Mt. Kinabalu, Penibukan ; (♀ fl., fr.), *Clemens* 40880 (BM, K). Sandakan ; (♂), *Creagh s.n.* (K). Kudah ; Sept. (♂), *Kloss* 19295 (BO, K).

Celebes. C. Celèbes : Malili ; Aug. (♀ fr.), *Kjellberg* 2007 (BO). Tolala ; Oct. (? fl.), *Kjellberg* 2445 (BO). Nuha ; Nov. (♀ fl.), *Kjellberg* 2781 (BO). S.E. Celebes : Wawatobi ; Mar. (♂), *Kjellberg* 887 (BO). Kendari, Abuki ; Mar. (♀), *Kjellberg* 922 (BO). Puhara, Muara Sampara ; Apr. (♀ fl., fr.), *Kjellberg* 1330 (BO).

Philippines. No locality ; (♂), *Vidal* 1116 (K). Palawan : May (♀ fl.), *Merrill* 1220 (BM, BO). Taytay ; Apr. (♂), *Merrill* 9230 (BM, BO, K). *ibidem* ; Apr. (♀ fr.), *Merrill* 9235 (BM, BO, K). Luzon : Rizal Prov., Antipolo ; Apr. (♂), *Ahern's coll.* 451 (BM, BO, K). Isabela Prov., Mt. Moises ; Apr. (? fl.), *Clemens* 16897 (BO). Albay Prov. ; (♀ fl.), *Cuming* 1252 (BM, K). Antipolo ; Mar. (♀ fr.), *Loher* 1985 (K). *ibidem* ; Apr. (♂), *Loher* 1986 (K). Bosoboso, Morong ; (♂), *Loher* 1987 (K). Bataan Prov., Mt. Mariveles ; May (♀ fl.), *Meyer* 3112 (BO, K). Ilocos Norte Prov. ; Mar. (? fl.), *Ramos* 7610 (BO). *ibidem* ; Feb.-Mar. (♀ fl.), *Ramos* 27301 (BO). Antipolo ; (♂), *Vidal* 196 (K). Bulacan Prov. ; Angat ; Mar. (♂), *Vidal* 1123 (K, L). Polillo Is. : Karlagan ; Dec. (♂), *Fox* 9048 (L). Sibuyan Is. : Mt. Giting-Giting ; Mar. (♂), *Elmer* 12101 (BM, BO, K). Biliran Is. : Mt. Suiro ; May (♂), *Sulit* 21646 (L). Guimaras Is. : Buenavista ; Mar. (♀ fr.), *Sulit* 11784 (L). Sulu Is. : Tawitawi Is. ; (♀ fr.), *Ramos and Edaño* 44004 (BM, BO, K). Basilan Is., Jan. (♂), *Hallier* 4515 (L.). Mindanao : Davao Prov. ; Aug. (♀ fr.), *Edaño* 11004 (BO, L). *ibidem,* Magdug River ; Aug. (♂), *Edaño* 11069 (L). Surigao Prov. ; (♂), *Ramos* 34614 (K). Zamboanga Distr., Malangas ; (♂), *Ramos and Edaño*3 7034 (BO). Davao Prov., Mati ; Mar. (♂), *Ramos and Edaño* 49245 (BM, BO). Lanao Prov. ; Feb. (? fl.), *Zwickey* 1196 (BO).

Cult. in Hort. Bogor : XI.B.1 (=XVII.1.67) ; (♀ fl., fr., ♂), (BO, K). XI.B.45 ; (♂) (BO, K, L).

3. Hypserpa polyandra *Beccari,* Malesia **1,** 148 (1877) ; Warburg in Engl. Bot. Jahr. **13,** 315 (1891) ; Schum. et Laut., Fl. Deutsch. Schutz. Süd. 315 (1901) ; Diels in Engl. Pflanzenr. Menisp. 213 (1910) ; White in Journ. Arn. Arb. **10,** 212 (1929). Type : N. Guinea, Andai, *Beccari* PP.552 (iso. K !).

Hypserpa selebica Becc., Malesia **1,** 148 (1877) ; Diels in Engl. Pflanzenr. Menisp. 212 (1910) ; Type : S.E. Celebes, Kandari, *Beccari s.n.* (iso. K !).

Limacia monilifera Burkill in Hook. Ic. Pl. 2585 (1899). Type : Solomon Is., Florida Is., *Cumins* 350 (holo. K !).

Hypserpa monilifera (Burkill) Diels in Engl. Pflanzenr. Menisp. 209 (1910).

Hypserpa raapii Diels in Engl. Pflanzenr. Menisp. 212 (1910) ; Yamamoto in Journ. Soc. Trop. Agric. **16,** 98 (1944). Type : Sumatra, *Raap* 607 (isos. K !, L !).

? *Hypserpa latifolia* Miq. ex Diels in Engl. Pflanzenr. Menisp. 213 (1910). Type : New Guinea, *Zippelius s.n.* (holo. L !).

Scandent shrub or woody climber up to about 40 m. high. *Branchlets* minutely yellowish puberulous to glabrescent. *Leaves* with petioles 2·0–4·5 (–6) cm. long, puberulous ; lamina ovate to ovate-elliptic, 6–17 cm. long, 4–11 cm. broad, apex shortly and often abruptly acuminate, or obtuse, sometimes mucronulate, base obtuse to rounded and sometimes abruptly cuneate, 5–7-nerved ; lateral nerves 1–3 pairs ; both surfaces sparsely puberulous to glabrous ; stiffly chartaceous to coriaceous *Inflorescences* paniculate, 2·5–11 cm. long, 1·5–5·0 cm. broad, ± triangular in outline, yellowish puberulous. *Male flowers* yellow, subsessile or with pedicels up to 1 mm. long : sepals 7–12, outer 2–5 ± triangular to rotund, 0·5–1·0 mm. long, puberulous outside, inner (4–) 5–7 ± rotund, 2–3 mm. diameter, margin sometimes minutely ciliolate ; petals (5–) 7–8, very variable in shape, 0·75–1·0 mm. long, margin often undulate ; stamens about 20–40, connate, 1·5–2·0 mm. long. *Female flowers* : sepals and petals similar to male ; carpels 3, ± ellipsoid, 0·75 mm. long. *Drupes* white or red on pedicels up to 2 mm. long or subsessile, subrotund to obovate in outline, 7–8 mm. long and broad, 4–6 mm. thick. Endocarp rugulose, perforate.

Distribution. Batu Is. (Sumatra), Flores, S.E. Celebes, Ternate, N. Guinea, Solomon and Caroline Is.

Habitat. Recorded from mangrove swamps and forests up to 1200 m. altitude.

Uses. Bark after being pounded and powdered is applied to the head as a treatment for headaches in Bougainville Is.

Vernacular Name. *Bougainville Is.* : luckali.

Notes. Diels placed *H. monolifera* in his key under ' Stamina libera vel paulum et irregulariter coaliter' ; although the only specimen he quoted was female (i.e. *Cumins* 350, Solomon Is.). A second, more recent specimen from Solomon Is. (*Kajewski* 2125) is clearly conspecific with *Cumins* 350, but has male buds containing connate stamens exactly as in *H. polyandra*. *H. monolifera* is therefore placed in synonymy under *H. polyandra*. The ' staminodes ' originally described by Burkill for *Cumins* 350 are also present in the male specimen, *Kajewski* 2125, and are, in fact, petals. Burkill described the petals as absent.

H. raapii was distinguished by Diels from *H. polyandra* by the number of inner sepals being 4 in the former and 6 in the latter. *H. raapii* is still only represented by the solitary, male type specimen (*Raap* 607) which does indeed usually have 4 inner sepals, but 5 also occur. Since (4–) 5–7 inner sepals are found in *H. polyandra*, and *Raap* 607 agrees in all other respects with that species it is not possible to maintain *H. raapii* as a dis-

tinct species. This results in a rather curious distribution for *H. polyandra*, since *Raap* 607 was collected in the Batu Is. west of Sumatra while *H. polyandra* is only known otherwise in E. Malaysia.

H. latifolia was described by Diels from a specimen collected by Zippelius in New Guinea and labelled by Miquel as *Limacia ? latifolia*. The specimen consists of 2 young shoots with puberulous broadly elliptic leaves, obtuse to ± rounded at the apex, and with very young puberulous inflorescences. This is almost certainly a young shoot of *H. polyandra*.

Collections examined :—

Sumatra. Batu Is. ; Nov. (♂), *Raap* 607 (K, L).

Lesser Sunda Is. Flores ; Feb. (? fl.), *Elbert* 4318 (BO, L) and 4338 (L).

Celebes. Lepo-Lepo, near Kandari ; July (♀ fr., ♂), *Beccari s.n.* 1874 (K).

Moluccas. Ternate : Toboko ; Oct. (♂), *Beguin* 1064 (BO) and *ibidem* July (♂), *Beguin* 1685 (BO, L). Kei Is. : (♀ fl.), *Jaheri s.n.* (BO).

N. Guinea. West N. Guinea : Slieber, 40 km. from Nabire ; Mar. (? fl.), *Kanehira and Hatusima* (BO). North East N. Guinea : Morobe District, Sattelberg ; Sept. (♀ fr.), *Clemens* 164 (L.). Sepik region ; *Ledermann* 9436 (K). *ibidem* (♀ fr., ♂), *Ledermann* 9538 (BM, K). *ibidem* (♂), *Ledermann* 10627 (K, L). *ibidem* (♂), *Ledermann* 10874 (K). Mayen ; July (? fl.), *Schlechter* 17917 (K). Papua : E. Divn., Domara R. ; May (♂), *Brass* 1587 (K). W. Divn., Daru Is. ; Mar. (♂), *Brass* 6398 (BO, L). Isuarawa ; Mar. (? fl.), *Carr* 15973 (K, L). Aru Is. : Giabu-Lengan ; May (♂), *Beccari s.n.* 1873 (K). Kobroör Is., Namadubule June (? fl.), *Buwalda* 5214 (BO, K, L). Triangan Is., Kp. Ngaibor ; July (♀ fr.), *Buwalda* 5452 and 5453 (BO, K, L).

Solomon Is. Florida Is., Lalavanola ; (♀ fr.), *Cumins* 350 (K). Bougainville Is., Koniguru, Buin ; Aug. (♂), *Kajewski* 2125 (BO, L).

Caroline Is. Ponape ; (♀ fl.), *Ledermann* 13489 (K).

Pachygone *Miers ex Hook. f. et Thoms.*

Pachygone *Miers* [in Ann. Mag. Nat. Hist. II. **7,** 43 (1851) *nom. nud.*] ex Hook. f. et Thoms., Fl. Ind. **1,** 202 (1855) ; Benth. in Benth. et Hook. f. Gen. Pl. **1,** 38 (1862) ; Miers, Contrib. Bot. **3,** 328 (1871) ; Diels in Engl. Pflanzenr. Menisp. 241 (1910) ; Backer, Bekn. Fl. Java (em. ed.) **3,** fam. 34. 16 (1941).

Tristichocalyx F. v. M., Fragm. **4,** 27 (1863).

Woody climbers. Leaves petiolate ; lamina ± ovate, base 3- or 5-nerved, indumentum of unicellular hairs. *Inflorescences* axillary, racemose. *Male flowers* : sepals 6–12, inner ones larger, imbricate ; petals 6, auriculate towards base ; stamens 6. *Female flowers* : sepals and petals similar to male ; carpels 3, glabrous, style reflexed, stigma entire, staminodes 6. *Drupe* subcompressed-obovoid, style scar near base ; endocarp rather smooth with lateral, elongate depressions. *Seed* curved, exalbuminous with 2 membranous integuments enclosing embryo.

Distribution. China, S.E. Asia, Malaysia, Australia and Polynesia. One species in Malaysia ; 11 more species have been described from surrounding regions, but this number will probably have to be reduced.

Pachygone ovata (*Poir.*) *Hook. f. et Thoms.*, Fl. Ind. **1,** 203 (1855); Miq., Fl. Ind. Bat. **1,** (2) 86 (1858) ; Miers in Ann. Mag. Nat. Hist. III. **19,** 321 (1867), et Contrib. Bot. **3,** 331, t. 135 (1871) ; Hook. f. et Thoms. in Hook. f., Fl. Brit. India **1,** 105 (1872) ; Beccari, Malesia **1,** 158 (1887) ; Boerlage, Cat. Pl. Bog. **1,** 43 (1899) ; Schum. et Laut., Fl. Deutsch. Schutzgeb. Südsee 315 (1901) ; Valeton in Bull. Dép. Agr. Ind. Néerl. **10,** 12 (1907) ; Diels in Engl. Pflanzenr. Menisp. 243 (1910).

Cissampelos ovata Poir., Encycl. Méth. Bot. **5,** 10 (1804) ; DC., Syst. **1,** 537 (1817), et Prod. **1,** 102 (1824). [Type not seen].

Cocculus brachystachyus DC., Syst. **1,** 528 (1817), et Prod. **1,** 99 (1824) ; Decne. in Ann. Nouv. Mus. Paris **3,** 424 (1834) ; Spanoghe in Linnaea **15,** 163 (1841). [Type not seen].

Cocculus leptostachyus DC., *l.c.* 528, et *l.c.* 99 ; Decne. *l.c.* 424 ; Spanoghe *l.c.* 163. [Type not seen].

Cocculus plukenetii DC., *l.c.* 520, et *l.c.* 97 *pro. parte, quoad Cocculus officinarum Pluk.* ; Wight, Icon. **3,** tt. 824, 825 (1844).

[*Cocculus wightianus* Wall. Cat. no. 4959 (1831–2) *nom. nud.*]

Pachygone pubescens Benth., Fl. Austral. **1,** 58 (1863) ; Diels in Nova Guinea **8,** 283 (1910), et in Engl. Pflanzenr. Menisp. 245 (1910) ; Winkler in Engl. Bot. Jahr. **49,** 369 (1913) ; Merrill, Enum. Born. Pl. 250 (1921) ; Yamamoto in Journ. Soc. Trop. Agric. **16,** 103 (1944). Type : Queensland, Quail Isl., *Flood s.n.* (holo. K !).

Tristichocalyx pubescens (Benth.) F. v. M., Fragm. **4,** 27 (1863) ; Miers, Contrib. Bot. **3,** 286 (1871).

Tinospora hullsii F. v. M., Fragm. **5,** 147 (1866). Type : Queensland, Escape Cliff, *Hulls s.n.* (iso. K !).

Pachygone brachystachya (DC.) Miers in Ann. Mag. Nat. Hist. III. **19,** 321 (1867), et Contrib. Bot. **3,** 334 (1871).

Pachygone leptostachya (DC.) Miers *l.c.* 321, et *l.c.* 335 ; Diels in Engl. Pflanzenr. Menisp. 244 (1910).

Pachygone plukenetii (DC.) Miers *l.c.* 321, et *l.c.* 330, t. 135.

Pachygone ovata (Poir.) Hook. f. et Thoms. *var. rotundifolia* Miq., Ann. Mus. Ludg. Bat. **4,** 87 (1868). Based on *Cocculus brachystachyus* DC.

Pachygone ovata (Poir.) Hook. f. et Thoms. *var. dasyphylla* Miq., *l.c.* 87. Type : Java, *Horsfield s.n.* (holo. K !, iso. L !).

Pachygone adversa Miers [in Ann. Mag. Nat. Hist. III. **19,** 321 (1867) *nom. nud.*] Contrib. Bot. **3,** 332 (1871). Type : Ceylon, *Thwaites* 1054 (holo. K !).

Pachygone concinna Miers [*l.c.* 321 *nom. nud.*] *l.c.* 330. Type : India, Courtallam, *Thomson s.n.* (? K).

Pachygone hebephylla Miers [*l.c.* 321 *nom. nud.*] *l.c.* 333. Diels in Engl. Pflanzenr. Menisp. 245 (1910) ; Backer, Schoolfl. Java 45 (1911) ; Koorders, Exk. Fl. Java **2,** 235 (1912) ; Backer, Bekn. Fl. Java (em. ed.) **3,** fam. 34. 17 (1941) ; Yamamoto in Journ. Soc. Trop. Agric. **16,** 103 (1944). Type : Java, *Horsfield* 304 (holo. K !, iso. L !).

Pachygone hullsii (F. v. M.) F. v. M., Fragm. **9,** 81 (1875).

Cebatha pubescens (F. v. M.) Kuntze, Rev. Gen. **1,** 9 (1891).

Limacia nativitatis Ridl. in Journ. As. Soc. Straits Br. **45,** 170 (1906). Type : Christmas Is., *Ridley s.n.* (holo. K !).

Woody climber up to 15 m. or more high. *Branchlets* puberulous to pubescent with yellowish hairs, later glabrescent. *Leaves* with petioles 2·5–4·0 cm. long, yellowish pubescent to glabrous ; lamina ovate-lanceolate to ovate, [5–] 7–11 cm. long, 3–7·5 cm. broad, apex obtuse to

acutely acuminate, mucronate, base truncate, rounded or very obtuse (rarely subcordate), 3–5-nerved ; lateral nerves 1–2 pairs ; both surfaces softly pubescent to glabrous ; chartaceous. *Inflorescences* axillary, solitary or 2–3 arising together, racemose with flowers often in small clusters of about 3–5 along main axis, 4–17 cm. long, yellowish puberulous. *Male flowers* yellow on pedicels 1–3 [-7] mm. long : sepals 6–12, outer 3–6 bracteoliform, ± elliptic, 1–2 mm. long, puberulous outside, inner 3–6 elliptic to rotund, 1·5–2·5 mm. long, 1·25–1·5 mm. broad, glabrous or sparsely hairy outside ; petals 6, ± oblong, auriculate below, 1–1·5 mm. long, glabrous ; stamens 6, filaments slender, 1·25 -1·5 mm. long. *Female flowers* : sepals and petals similar to male, carpels 3, ± ovoid, 0·75 mm. long, style flattened, staminodes 6, minute. *Drupes* on pedicels c. 3–5 mm. long, subcompressed, ± obovoid, 7–8 mm. long, 6 mm. broad, 5 mm. thick, glabrous, rather smooth.

Distribution. In Malaysia : Java, Borneo, Timor, Moluccas and N. Guinea. Also in Madras, Ceylon and N.E. Australia.

Habitat. Recorded from altitudes up to 100 m. on seashores and in forests.

Vernacular Names. *Java* : geureung ikan. *N. Borneo* (*Bajau*) : luod.

Notes. Diels maintained as distinct 4 of the species listed in the above synonymy, these were *P. ovata*, *P. pubescens*, *P. leptostachya* and *P. hebephylla*. The characters used by Diels in his key to separate these ' species ' were : presence or absence of indumentum on the leaf, other than along the nerves, and shape of leaf and of leaf apex. He separated *P. ovata* with ' Folia obtusiuscula ' from *P. leptostachya* with ' Folia ± acuta '. In his description, however, of *P. ovata* he described the leaf ' apice obtusa vel acutiuscula '. Thus there is no good distinction between *P. ovata* and *P. leptostachya*. Further, he distinguished *P. hebephylla* with ' Folia elliptica obtusa conspicue mucronulata ' to contrast with *P. pubescens* having ' Folia ± ovata '. But in this descriptions *P. hebephylla* is said to have leaves ' ovata vel elongato-ovata '. Thus again no adequate distinction is made between these two species.

It appears that there is, in fact, only one species of *Pachygone* in Malaysia with a variable leaf shape, becoming broader eastwards, and with considerable variation in the degree of hairiness on the leaves. The inflorescence, floral and fruit characters are rather constant.

Malaysian collections examined :—

Java. No locality (♂), *Horsfield* 304 (K, L). W. Java : N. of Kalipatjang ; Sept. (st.), *Backer* 4534 (BO). E. Java : N. of Puger, Mt. Sadeng ; Dec. (st.), *Backer* 18270 (BO). Christmas Is. : Flying Fish Cove ; Oct. (? fl.), *Ridley* 140 (K). Madura : E. of Ambunten, July (♂), *Backer* 21213 (BO, K).

Lesser Sunda Is. Timor : no locality ; (♂), *Spanoghe s.n.* (K). Kupang, (♀ fl.), *Teijsmann s.n.* (BO, L).

N. Borneo : Semporna, Lumangas ; Apr. (♂), *BNB* (*Mail*) 4087 (K).

Moluccas : Mangoli Is., Tabulo Is. ; (♀ fr.), *Hulstijn* 202 (L).

N. Guinea. West N. Guinea : Merauke, July (♂), *Branderhorst* 3 (K). Okaba ; Oct. (♀ fr.). *Branderhorst* 136 (K). Nassau Mts. ; (♀ fr.), *Doct. van Leeuwen* 10686 (K, L). Merauke, (? fl.), *Valeton s.n.* (L.). East N. Guinea : Bismarck Mts. ; Sept. (♀ fl.), *Lauterbach* 2751 (K).

SCHIMPER'S FIRST VISIT TO THE SEMIEN RANGE.

J. B. Gillett

Botanists wishing to ascertain the type localities of the numerous species described from W. G. Schimper's collections in N. Ethiopia will consult in the first place Dr. G. Cufodontis' paper in Phyton 3 : 84–89 (1951). There seems however to be a mistake in this most useful work which may cause some confusion. Dr. Cufodontis states that Schimper collected in 1837–38 in the " Umgebung von Adua in Tigre " and only in Jan.–May 1840 in the " Hochgebirge von Semien ".

Actually Schimper, as is stated by Hochstetter and Steudel in Linnaea 12 : 115 (1838) intended to visit Semien in late autumn 1837. He seems to have had to postpone his visit for some months, but consulting his specimens of *Trifolium* and *Dianthus* we find

" Enschedcap " 6.6.1838
" Bachit " 23.6.1838
" Bachit prope Enschedcap " 2.7.(1838)
" Demerki " 8.8.1838 and 14.8.1838

The nearest dates for which " Adoa " or " prope Adoa " is given are 19.9.1837, 28.9.1837, 30.9.1837, 3.10.1837 and 16.11.1838.

Schimper's Bachit or Mons Bachit is spelt Buahit, c. 38° 15′ E., 13° 15′ N. on the 1 : 500,000 British G.S.G.S. map 4355 sheet N.D. 37/5 (1947). Enschedcap seems to be Encetcab at 38° 2′ E., 13° 7′ N. on the same sheet. It has not been possible to locate Demerki exactly but Dr. Cufodontis states that it is " Am berge Bachit in Semien ". There thus seems to be no doubt that Schimper visited Semien for the first time in the summer of 1838 and that the journey in the spring of 1840 to which Dr. Cufodontis refers must have been a second visit.

The Amateur's Greenhouse.*—This is the sixth impression of the fourth edition of a book first published in 1930. Obviously there is still a great demand for this popular work which has been thoroughly revised and brought up to date by Mr. A. G. L. Hellyer and forms a complete guide to the cultivation and management of the amateur's greenhouse. The latest information on the subject is presented here in a pleasant, readable form and every phase of greenhouse maintenance is dealt with in a comprehensive manner. There are chapters on greenhouse construction, heating, nagement, propagation and pests. Useful information on the cultivation of suitable plants is supplied together with a classified list of plants, which includes shrubs, annuals, biennials, bulbs, fruits, cacti and succulents. The year's work in the greenhouse is indicated, followed by a description of John Innes composts. The book, which is well printed and produced, contains many excellent photographs and line drawings and is provided with a useful index. It should be of interest to all those who take a delight in the cultivation of greenhouse plants.

H. S. Marshall.

* The Amateur's Greenhouse. By A. J. Macself. 4th rev. ed. Pp. xi + 302. 48 pls. 35 line drawings. London : W. H. & L. Collingridge Ltd. 1957. Price 21/-.

NOTES ON THE FLORA OF 'IRAQ WITH KEYS—PART IV.*

R. A. Blakelock

The families *Portulacaceae*, *Ficoidaceae*, *Nyctaginaceae*, *Amaranthaceae*, *Chenopodiaceae* and *Theligonaceae* are dealt with in the present part. These are all families included in the Order [" Reihe "] *Centrospermeae* in Pflanzenfam. **16c** (1934). This arrangement departs from that of Bentham and Hooker " Genera Plantarum ", but is in accordance with that used by Burtt and P. Lewis " On the Flora of Kuweit " in Kew Bull. 1952 and 1954.

In the keys and enumeration the species are listed as in the preceding parts of these Notes.

Portulacaceae

Portulaca *L.*

A¹ Plant glabrous or with a few hairs at nodes ; leaves flat ; flower c. 12 mm. diam. ; petals yellow . . . . . *P. oleracea* L.

[A¹ Plant with long crisped hairs ; leaves terete ; flowers 25 mm. or more in diam. ; petals yellow (or red, white or striped) *P. grandiflora* Hook.]

[**Portulaca grandiflora** *Hook.*

Zafraniya, Baghdad liwa, 40 m., cultivated, flower yellow, 11.6.1947, *Ahmed* 9843.

Distr. A native of S. America.]

Ficoidaceae

A. Plants papillose ; leaves terete or flat

B. Petals shorter (up to 6 mm. long) or absent

C. Upper leaves linear, terete or semiterete, up to 2 mm. wide ; sepals less accrescent up to 5–7 mm. long ; petals white, linear 4–6 mm. long . . . . . *Mesembryanthemum nodiflorum* L.

C¹ Upper leaves oblong or linear, flat, wider ; sepals accrescent 5–15 mm. long ; petals absent . . . *Aizoon hispanicum* L.

[B¹ Petals 15–20 mm. long, longer than sepals ; leaves ± terete *Mesembryanthemum violaceum* DC.]

A¹ Plant with stellate hairs ; leaves flat, obovate to orbicular cuneate at base . . . . . *Glinus lotoides* L.

This family is dealt with by Pax and Hoffmann in Pflanzenfam. **16c,** 180–233 (1934) under the name *Aizoaceae.*

[**Mesembryanthemum violaceum** *DC.* Pl. Grass. t. 84 (1801) (*Lampranthus violaceus* (DC.) Schwant.) (det. A. A. Bullock).

* Continued from Kew Bull. 177–224 (1957).

Basra, grows here very prolifically, never previously found in this part of 'Iraq, 4.5.1949, *L. G. Wylde*, H.600/49.

Distrib. Native of S. Africa (Cape Peninsula) according to Jacobsen but not mentioned by Adamson and Salter "Flora of the Cape Peninsula" 1950.

There is an enumeration of the genus *Mesembryanthemum* L. by H. Jacobsen in Fedde Rep. Sp. Nov. Beih. **106,** 1–198 (1938).]

Glinus lotoides *L.* (*Mollugo hirta* Thunb.).

Recorded under the synonym *Mollugo hirta* by Anthony p. 289 (1935) and also by Blatter in Journ. Ind. Bot. Soc. **11,** 32 (1932) from Makina Mæsus near Basra, *Whitehead* 14. Specimens from 'Iraq have already been cited in "The Rustam Herbarium" in Kew Bull. (1948) 431 (1949).

Nyctaginaceae

[**Bougainvillea** *Comm.*

A. Perianth ± pubescent ; leaves and stems subglabrous or sparsely pubescent . . . . . *B. glabra* Choisy

A! Perianth densely pubescent ; leaves and stems pubescent *B. spectabilis* Willd.

These two species are kept separate by F. G. Preston in R.H.S. Dictionary of Gardening 302 (1951). Both are natives of Brazil and are widely cultivated in the warmer parts of the world.]

Bougainvillea glabra *Choisy*

Colloquial name ghanamiya, *M. S. al-Radzi* 5428 ; Baghdad, cultivated, bracts purple, ornamental climber, not quite hardy in Baghdad, 11.6.1947, *Hamad Ahmad* 10109.]

Amaranthaceae

A. Inflorescence branches densely white tomentose, cylindrical ; stamen 4-thecate ; leaves alternate . . . . . *Aerva* Forsk.

A! Inflorescence not densely white tomentose

B. Leaves alternate ; inflorescence cylindrical to ± globose, bracteoles green in centre at most scarious at margin ; stamen 4-thecate *Amaranthus* L.

B! Leaves opposite : inflorescence ± globose up to 1 cm. long ; bracteoles white scarious ; stamen 2-thecate . . *Alternanthera* Forsk.

An account of this family is given by Schinz in Pflanzenfam. **16c,** 7–85 (1934).

Aerva javanica (*Burm. f.*) *Spreng.* (*A. tomentosa* Forsk ; *A. persica* (Burm. f.) Merrill).

Boissier **4,** 993 (1879) cites specimens as "Babylonia (Auch. 3193 ! Noë !)". There is a note on this species by Burtt and Lewis in Kew Bull. 351 (1952).

Alternanthera sessilis (*L.*) *R. Br.*

Basra, single large plant on dirty tidal river bank in city, in mud, 16.3.57, *Haines* W876.

Blatter in Journ. Ind. Bot. Soc. **11,** 40 (1932) records this from ditches just above water line, Makina Masus near Basra, flowers Dec.–Feb., 1916–18, *Whitehead* 59.

Amaranthus *L.*

A. Inflorescences axillary about as long as wide, not exceeding leaves, up to 0·5 cm. long ; bracts and bracteoles ending in small spines ; usually 3 tepals

B. Longer bracts over ½ as long as, as long as or scarcely longer than tepals of female flowers ; tepals shorter than fruit

C. Leaves oblong or shortly ovate or linear-lanceolate, more than twice as long as wide ; bracts lanceolate ; middle nerve of female tepal generally considerably thickened towards apex
A. graecizans L. var. *graecizans*

C! Leaves ovate or elliptic-rhomboid, less than twice as long as wide; bracts generally ovate-lanceolate ; female tepals generally thin, middle nerve scarcely thickened
A. graecizans var. *silvestris* (Vill.) Asch.

[B! Longer bracts up to twice the length of the tepals ; fruit longer than tepals . . . . . *A. albus* L.]

A! Inflorescence tapering cylindrical, terminal as well as axillary, terminal inflorescence usually longer than leaves

D. Bracts and bracteoles up to 2 mm. long, not ending in a spine or bristle ; tepals 3 as long as or shorter than fruit ; fruit indehiscent, rugose . . . . . *A. viridis* L.

D! Bracts and bracteoles 3–5 mm. long, ending in a spine or bristle ; tepals 3 or 5 ; fruit circumscissile

E. Leaves and stem grey-pubescent ; 5 tepals ; female tepals ± spathulate longer than fruit . . . . . *A. retroflexus* L.

E! Leaves and stem glabrous or sparsely hairy

F. Tepals 3 usually longer than fruit, ovate or oblong lanceolate rarely oblong-spathulate
A. tricolor L. subvar. *gangeticus* (L.) Thell.

F! Tepals 5

[G. Female tepals rhomboid shortly ovate to wide spathulate, margins overlapping ; terminal branch of inflorescence nodding from the base . . . . . *A. caudatus* L.]

G! Female tepals lanceolate, elliptic or narrowly spathulate, margins scarcely touching each other ; inflorescence erect or at most nodding from the middle
A. hybridus L. var. *paniculatus* (L.) Thell.

There is a treatment of this genus by Thellung in Ascherson and Graebner Synopsis Mitteleuropäischen Flora **5,** 125–356 (1914), which has been utilized in preparing the above key. The nomenclature is in a very confused state in this genus and Thellung's names are not always in accordance with modern practice. The accounts of the genus given by Bailey Manual of Cultivated Plants 355 (1949) and by Fernald Gray's Manual of Botany ed. 8, 601–604 (1950) have also been consulted. Much helpful advice has been received from Mr. J. P. M. Brenan while preparing this account of the genus.

[**Amaranthus albus** *L.*

Baghdad, River Tigris, c. 30 m., silt banks left by receding river, erect herb up to 1 m. high, green flowers, 19.9.1954, *Guest* 13467 ; Baghdad, Tarmiya, dry ditchside, plentiful, 6.10.1954, *Haines* W15 ; Cult. Kew, stems ascending, seed from *Haines* W15, 25.10.1955, K4693.
Distr. N. America, elsewhere introduced.]

" **Amaranthus blitum** *L.*"

Blatter l.c. records this from bank of creek, Makina Masus, flowering in Nov., 1916–1918, *Whitehead* 121. This name should be rejected as it has become a long persistent source of error (see Int. Code of Bot. Nomenclat., Art. 65 : 1956).

[**Amaranthus caudatus** *L.*

Boissier **4,** p. 988 (1879) records a specimen from " Mesopotamia " collected by Botta, but this may not be from 'Iraq. Thellung l.c. p. 231 includes this under *A. hybridus* L. but it seems better treated as a separate species, as is done by Bailey l.c. p. 355 and Fernald l.c. p. 602.

An introduction from Tropical America ; this species is widely cultivated under the name " Love-Lies-Bleeding ".]

Amaranthus graecizans *L.* var. **graecizans** (*A. angustifolius* Lam. subsp. *graecizans* (L.) Thell.).

Specimens from 'Iraq have been cited in " The Rustam Herbarium " in Kew Bull. p. 445 (1950) under " *A. angustifolius* L.", a misprint for " *A. angustifolius* Lam." As Lamarck cites *A. graecizans* L. in the synonymy of *A. angustifolius*, they are based on the same type and *A. graecizans* L. should be used as it is the earlier name. Burtt and Lewis in Kew Bull. 352 (1952) prefer the name *A. angustifolius* Lam.

Amaranthus graecizans *L.* var. **sylvestris** (*Vill.*) *Asch.* ex Schweinf. Beitr. Fl. Aethiop. 176 (1967) (*A. sylvestris* Vill.).

Recorded by Anthony p. 296 (1935) from Amara as "*A. sylvestris.* Desf." Thellung l.c. p. 302 regarded this as a " Rasse " of " *A. angustifolius* Lam." It had already been reduced to a variety by Ascherson.

Amaranthus hybridus *L.* var. **paniculatus** (*L.*) *Thell.* l.c. p. 247.
Basra, in cultis, Apr. 1851, *Noë* 469 (B.M.).

Boissier **4,** p. 989 (1879) cites specimens " Babyloniae ad Baghdad et Bassora (Noë !) " as *A. paniculatus* L. Thellung, however, regards this as a " Rasse " of *A. hybridus* L., a rank not recognized by the International Code of Nomenclature 1956. Fernald l.c. p. 602 reduces *A. paniculatus* L. to a synonym of *A. cruentus* L. He states that it is introduced and adventive in America from Asia. Thellung gives the distribution as warm and temperate regions of both Hemispheres.

Amaranthus tricolor *L.* subvar. **gangeticus** (*L.*) *Thell.* l.c. 276.

Rustam Farm, 29.10.1932, *Field & Lazar* 429.

Blatter in Journ. Ind. Bot. Soc. **11,** 40 (1932) cites specimens from Makina Masus near Basra, flowers in June, 1916–18, *Whitehead* 160 and 169 as *A. gangeticus* L. Thellung l.c. regards as a subvariety of *A. tricolor* L. Bailey l.c. p. 355 reduces *A. gangeticus* L. to a synonym of *A. tricolor* L.

Amaranthus viridis *L.* (*A. gracilis* Desf.).

Recorded by Anthony p. 296 (1935) from Jabal Hamrin ; specimens have already been cited in " The Rustam Herbarium " in Kew Bull. 445 : 1950. Thellung l.c. p. 304 and 325 states that the type specimen is a mixture of *A. gracilis* Desf. and *A. lividus* Hornem. subsp. *ascendens* Thell. Fernald l.c. p. 603 uses the name *A. viridis* L.

Chenopodiaceae

Artificial Key to Genera

A. Plant with spines on vegetative parts

B. Stem-spines present . . . . . *Noaea* Moq.

B¹ Leaves ending in a spine ; no stem-spines

C. Leaves and stems long pilose all over ; leaves alternate ; perianth without membranous wings . . *Halimocnemis pilosa* Moq.

C¹ Leaves and stems glabrous or shortly pubescent, often hairy in the leaf-axils

D. Leaves alternate

E. Tufts of hairs in leaf-axils ; membranous perianth-wings in fruit

F. Leaves fleshy, pubescent, ending abruptly in a fine spine or bristle . . . . . *Agathophora* (Fenzl) Bunge

F¹ Leaves not fleshy, tapering into a spine . *Cornulaca* Del.

E¹ No tufts of hairs in leaf-axils . . . . . *Salsola* L.

D¹ Leaves opposite ending in a bristle rather than a spine *Anabasis* L.

A¹ Plant not spiny on vegetative parts

G. Leaves reduced to scales

H. Leaves and branches alternate

I. Perennial ; membranous perianth-wing in fruit ; embryo spiral . . . . . *Salsola subaphylla* C.A.M.

I¹ Annual ; no membranous perianth-wing in fruit ; embryo semicircular . . . . . *Halopeplis* Bunge

H¹ Leaves and branches opposite ; stem jointed and breaking readily at the nodes

J. Leaf-scales hairy above at base ; membranous perianth wings in fruit

K. Seed horizontal ; young shoots thinner . *Haloxylon* Bunge

K¹ Seed vertical ; young shoots thicker . . . *Anabasis* L.

J¹ Leaf-scales glabrous

L. Membranous perianth-wing in fruit . . *Haloxylon* Bunge

L¹ No membranous perianth-wing in fruit

M. Stems without very short, bud-like lateral shoots ; bracteoles of flower united, persistent

[N. Perennial ; seed with a lateral endosperm ; embryo semicircular . . . . . *Arthrocnemum* Moq.]

N¹ Annual ; seed without endosperm or with a very small central endosperm ; embryo conduplicate (cotyledons parallel to radicle)

Salicornia europaea L. var. *herbacea* L.

M¹ Stems with very short, bud-like lateral shoots ; bracteoles of flower free to base ; perennial

Halocnemum strobilaceum (Pall.) M.B.

G¹ Leaves not reduced to scales

O. Leaves always entire at margin, glabrous or hairy, generally narrower, flattened or terete

P. Leaves opposite ; membranous perianth-wing in fruit

Q. Leaves glabrous except sometimes in leaf-axils

R. Leaves not narrowed or rarely narrowed towards base up to 9 (rarely 15) mm. long (excluding bristle if present), 3 mm. wide ; seed vertical . . *Anabasis setifera* Moq.

R¹ Leaves narrowed towards base, often longer ; seed horizontal

S. Leaf-bases almost completely joined at nodes with no longitudinal channel down the internode ; dense tuft of white hairs in leaf-axil ; perianth parts and wings unequally developed in fruit, wings overlapping and upper part of perianth broad at base somewhat obtuse to the emarginate tip . . *Seidlitzia rosmarinus* Bunge ex Boiss.

S¹ Leaf-bases distinct with a longitudinal channel down each side of the internode from between the leaf-bases ; short sparse hairs in leaf-axil ; perianth parts and wings equally

developed in each flower, wings orbicular and more openly overlapping, the upper part of the perianth narrower at the base and more acute at the tip
Salsola longifolia Forsk.

Q¹. Leaves finely pubescent ; annual

T. Membranous perianth-wings in fruit
Girgensohnia oppositifolia (Pall.) Fenzl

[T¹ No membranous perianth-wings in fruit
Petrosimonia Bunge]

P¹ Leaves alternate

U. Leaves and stems glabrous or glabrescent.

V. Flowers in glomerules or solitary in axils of bracts

X. No membranous perianth-wings in fruit
Suaeda Forsk. ex Scop.

X¹ Membranous perianth-wing in fruit

Z. Lower leaves narrow-linear, acute, 1·5–7·5 cm. long, c. 0·5 mm. wide at middle ; vegetative parts minutely pubescent-scabrid or nearly glabrous ; perianth c. 3 mm. long in flower *Noaea tournefortii* (J. et S.) Moq.

Z¹ Leaves shorter or wider . . . . . *Salsola* L.

V¹ Flowers in axillary spikes ; fleshy-membranous perianth-wing continuous round fruit . . . . *Bienertia* Bunge

U¹ Leaves and stems ± hairy

1. Leaves pilose or villose with some of the hairs on leaves longer than width of leaf

2. Perianth with membranous wings in fruit

3. Perianth-wing in fruit up to 1·5 mm. long ; embryo-horse-shoe shaped . . . . . *Kochia* Roth

3¹ Perianth-wing in fruit larger ; embryo spiral
Salsola L.

2¹ Perianth without membranous wings in fruit

4. Perianth completely hidden by lanate hairs or with one spine on each segment of perianth . . . *Bassia* All.

4¹ Perianth not completely hidden by lanate hairs although it is hairy, no spines on perianth in fruit

5. Stamens with conspicuous yellow appendages
Halocharis Moq.

5¹ Stamens without conspicuous yellow appendages
Panderia pilosa F. et M.

1¹ Leaves pubescent or tomentose with hairs on leaves shorter than width of leaf

6. Perianth with membranous wings in fruit . *Salsola* L.

6¹ Perianth without membranous wings in fruit

7. Perianth hard and nut-like in fruit ; leaf-axils more tomentose than rest of leaf ; leaves shorter *Traganum* Del.

7¹ Perianth not hardened in fruit ; leaf-axils not more densely hairy than rest of leaf ; lower leaves 1·5–7·5 cm. long, narrowly linear . . . . *Noaea tournefortii*

O¹ Leaf-margin sinuate, toothed or entire, leaves flat often up to 1·5 cm. or more wide, glabrous or mealy not pilose (stalked glands in *Chenopodium botrys*)

8. Leaves and perianth glabrous

9. Leaf-margin entire ; membranous perianth-wing in fruit *Salsola* L.

9¹ Leaf-teeth usually present ; no membranous perianth-wing in fruit

10. Leaf-teeth small and inconspicuous or absent . . *Beta* L.

10¹ Leaf pinnatisect to hastate

11. Perianth woody in fruit . . . . . *Spinacia* L.

11¹ Perianth herbaceous to membranous and green or red and fleshy in fruit . . . . . *Chenopodium* L.

8¹ Leaves and perianth mealy

12. No bracteoles ; 2–5 perianth-segments persistent in fruit *Chenopodium* L.

12¹ Two persistent bracteoles at base of female flower ; no perianth in female flowers . . . . . *Atriplex* L.

Since the key given above is based mainly on vegetative or fairly conspicuous characters and applies only to the 'Iraq species a less artificial key describing the characters of the flowers and fruits is given below. The key below is mainly taken from that supplied by Ulbrich in Pflanzenfamilien **16C,** 443–452 (1934) with a certain number of changes. In many of the genera the more technical and more minute characters have been accepted from Ulbrich without being thoroughly checked.

Key to Genera of Chenopodiaceae

A. Embryo annular, sometimes horse-shoe-shaped, conduplicate or semicircular, completely or partly enclosing endosperm

B. Fruit opening by an operculum when ripe or at germination *Beta* L.

B¹ Fruit remaining closed, rarely crumbling, not opening by an operculum

C. Flowers arranged in glomerulate, less often spike-like, inflorescences

D. Flowers generally hermaphrodite, protogynous ; bracts absent; perianth almost always herbaceous and free at least to the

middle ; stamens 1 to 5, free or united below ; leaves frequently hastate, often roundish, generally with vesicular hairs (i.e. mealy) . . . . . *Chenopodium* L.

D¹ Flowers generally unisexual, male flowers without bracteoles, with a perianth, female flowers generally with bracteoles, without a perianth ; stamens 1 to 5 united below ; leaves usually hastate, with vesicular hairs (i.e. mealy) or glabrous

E. Fruit enclosed in perianth united to the apex and woody-hardened ; stigmas 4–5 ; leaves and stem glabrous *Spinacia* L.

E¹ Fruit enclosed in 2 bracteoles scarcely or only completely united and hardened to the middle sometimes united to the apex ; stigmas 2 rarely 3 ; leaves and stem with vesicular hairs when young, later often covered with a grey even encrustation due to their coalescing . . . . *Atriplex* L.

D² Flowers generally bisexual, cymose or spiciform ; bracteoles almost always absent ; perianth membranous, usually free to the middle at most ; stamens 4–5, more rarely fewer, free or united, leaves generally narrow and with long filamentous hairs

F. Embryo horse-shoe-shaped ; seed erect ; perianth enclosing the fruit, remaining membranous, only somewhat enlarged *Panderia* F. et M.

F¹ Embryo annular ; seed almost always horizontal ; perianth generally altering in fruit

G. Perianth remaining membranous in fruit, with fine thorns or small tubercles or long dense lanate hairs . *Bassia* All.

G¹ Perianth in fruit hardened at the base, without thorns with membranous or leathery wings on back . *Kochia* Roth

C¹ Flowers arranged in clavate conical inflorescences or sunk in hollows in apparently leafless twigs

H. Subtending leaves of flowers opposite

I. Subtending leaves of flowers free below, forming scutelliform scales . . . . . *Halocnemum* M.B.

I¹ Subtending leaves of flowers united, persistent ; the flowers apparently in hollows in superimposed twig-joints

J. Seeds with endosperm ; embryo curved campylotropous, rod-shaped . . . . . *Arthrocnemum* Moq.

J¹ Seeds without or with very scanty centrally placed endosperm ; embryo folded . . . . . *Salicornia* L.

H¹ Subtending leaves of flowers alternate, spiral ; seeds with endosperm ; embryo semicircular . . . *Halopeplis* Bunge

A¹ Embryo spiral, endosperm absent or divided by the embryo into two separate parts

K. Bracteoles of flowers small, scale-like ; perianth herbaceous or membranous ; stamens 5 ; stigma papillate all round ; embryo a flat spiral ; leaves glabrous, no sheath of collective cells on the vascular-bundles ; seeds vertical, horizontal or slanting

L. Fruits free in the perianth or only somewhat united at their base *Suaeda* Forsk. ex Scop.

L¹ Fruits adhering to the perianths almost all round ; perianth horizontally winged ; seed horizontal . . . *Bienertia* Bunge

K¹ Bracteoles as large as or larger than perianth very rarely smaller ; perianth generally membranous ; stamens 4–5, rarely fewer ; stigma only papillate on inside ; embryo conical, more rarely a flat spiral ; leaves generally covered by filamentous hairs, vascular bundles with a sheath of collective cells

M. Seeds horizontal, with the exception of some *Salsola* spp.

N. Twigs not jointed, with fair-sized leaves

O. Wings of fruit unequally large, 3 well-developed ones arising from the backs of the perianth-segments, the two upper ones (the front and back perianth segments) shell-shaped and bent back ; leaves fleshy cylindrical, blunt *Seidlitzia* Bunge

O¹ Wings of fruit equally large (not always so in *Salsola*)

P. Perianth stone-hard, fruit becoming nut-like *Traganum* Del.

P¹ Perianth unaltered in fruit except generally for the development of membranous wings, at most hardened at base . . . . . *Salsola* L.

N¹ Twigs jointed, leaves reduced to scales . . *Haloxylon* Bunge

M¹ Seeds vertical

Q. Three outer perianth-segments, one behind, two in front, two inner at the sides

R. Twigs noticeably leafy, not jointed ; style elongate ; stigmas lanceolate . . . . . *Noaea* Moq.

R¹ Twigs more or less noticeably jointed ; style and stigmas contracted ; five disc-lobes between the stamens

S. Twigs inconspicuously jointed ; perianth winged in fruit ; radicles upwards in seed . . . *Girgensohnia* Bunge

S¹ Twigs conspicuously jointed ; perianth winged in fruit ; radicles of the seeds below . . . . . *Anabasis* L.

Q¹ Two outer perianth-segments, one behind, one in front ; three inner at the sides

[T. Seeds dorsally compressed . . . *Petrosimonia* Bunge

T[1]. Seeds laterally compressed

U. Anthers with a vesicular connective ; no disc-lobes between the stamens

V. Radicles of the seeds below . . . *Halocharis* Moq.

V[1]. Radicles of the seeds above . *Halimocnemis* C.A.M.

U[1]. Anthers without an appendage on the connective or only somewhat acuminate ; disc-lobes between the stamens

X. Perianth-segments in fruit hardened and united at the base, each bearing a thorn . . . . *Cornulaca* Del.

X[1]. Perianth-segments in fruit free to the base, only the two outer ones with wings

Agathophora (Fenzl) Bunge

References to other literature on the family, especially the publications of Aellen, Brenan (Flora of Tropical East Africa ; Chenopodiaceae, 1954), Burtt and Lewis in Kew Bull. 1954, Eig and Iljin (Fl. U.R.S.S. **6,** 1936) are given under the genera or species concerned.

Until recently a great difficulty in enumerating the *Chenopodiaceae* of 'Iraq was the scarcity of fruiting material due to many species only ripening fruit late in the year. This difficulty has been largely met by the exertions of Mr. E. R. Guest, Dr. Rawi, Prof. K. H. Rechinger and their fellow-collectors, who have been at great trouble to obtain material of many of the critical or doubtful species from the South-Western Desert and elsewhere. In writing these notes I have been indebted for help and advice to Mr. J. P. M. Brenan and Mr. J. B. Gillett.

Agathophora alopecuroides (*Del.*) *Bunge*

Southern Desert, Al-Batin (Kuwait Border c. 100 km. S.E. of Busaiya), c. 150 m., compact sandy soil, abundant, 28.3.1956, *Guest and Ibrahim Mahallal* 15251 ; 35 km. W. of Nukheib, 250 m., silty plain, common, native name shiran, 14.3.1955, *Rawi* 14755 ; Southern Desert, Al-Batin (Kuwait Border, c. 100 km. S.E. Busaiya), c. 150 m., compact sandy soil, abundant, colloquial name sha'rán, 28.3.1956, *Guest and Ibrahim Mahallal* 15251 ; c. 25 km. S. by W. of Ramadi, c. 120 m., hard gravelly gypsum desert with some sand, rosy, frequent, 21.11.1956, *Guest, Rawi and Rechinger* 15938 ; c. 12 km. W. by S. of Karbala, c. 60 m., desert pavement with vertical gypsum plates out-cropping, occasional, 20.11.1956, *Guest, Rawi and Rechinger* 16153A (R8314) ; near Salaibiyat al-Hamir, c. 35 km. S. by W. of Ur, c. 20 m., on sandhills, frequent, 6.11.1956, *Guest, Rawi and Rechinger* 16053 (R8183A) ; c. 40 km. S. by W. of Ur (near Salaibiyat al-Hamir), 25 m., small sand dunes on " haswa " gravel plains, frequent, 6.11.1956, *do.* 16062 (R8181B) ; Southern Desert, 2 km. S. of Khidr al-Mai, 180 m., soil silty, pink, colloquial name sha'ran, 8.11.1956, *do.* 16111 ; same loc., pale greenish lemon yellow, 8.11.1956, *do.* 16112 ; same loc., silty, dirty green, 8.11.1956, *do.* 16113 (R8233), 16114 ; near Shitatha (c. 8 km. E. = c. 38 km. W. of Karbala) c. 40 m., colluvial soil (generally alluvium), rosy pink, frequent, 20.11.1956, *do.* 16167 ; same loc., apricot white, 20.11.1956, *do.* 16168 (R8351) ; c. 30 km. S. of

Ramadi, c. 100 m., gypsum desert with gravel, brownish-white, frequent, 21.11.1956, *do.* 16197 ; 30 km. W. of Darragi between Nasiriya and Samawa, salty soil growing with *Haloxylon*, woody stem, yellow flower, rare, colloquial name kherreit, 10.11.1956, *Rawi and Alkas* 16243 ; between Shithatha and Rahhaliya, 60 m., sandy gravelly subdesert, flowers pale pink, common, 12.11.1956, *Rawi and Alkas* 16323, 16324, 16328 ; Southern Desert, Khidhr al-Mai, 16.2.1956, *Serkahia* 16453 ; Southern Desert, between Shabicha and Salman, frequent, colloquial name dumrán, 18.10.1955, *Serkahia and Tikrity* 16466.

There is a note on this species by Burtt and P. Lewis in Kew Bull. 377 (1954).

Distr. Algeria, Egypt, Sinai, Palestine, " Arabia Petraea ".

Agathophora or **Traganum** sp.

5 km. S. of Sharana, 220 m., sandy soil with stones, common, 15.3. 1955, *Rawi* 14812 ; 35 km. W. of Nukheib, 250 m., silty plain, common, colloquial name shiran, 14.3.1955, *Rawi* 14755.

These specimens are too young for more accurate identification.

Anabasis *L.*

A. Small shrubs ; tomentose at nodes within base of leaves

B. Leaves reduced to scales no bristle at apex
A. articulata (Forsk.) Moq.

B! Leaves cylindrical subclavate often with a deciduous bristle at apex
A. setifera Moq.

[A! Annual ; leaves fleshy linear oblong with a deciduous bristle at apex
A. annua Bunge]

[**Anabasis annua** *Bunge* Anab. Rev. 46 : 1862.

Eig (in Pal. Journ. Bot. J. ser., **3,** 136 : 1945) cites a specimen from 70 km. W. of Rutba. As Zohary p. 49 (1950) does not list this species from 'Iraq perhaps this is a misidentification.

Type : Persia, Birdshand & Isfesar, Nov., *Bunge & Bienert*, Kew].

Anabasis articulata (*Forsk.*) *Moq.*

C. 28 km. W. by S. of Samawa, 15 m., slightly gravelly sandy desert, whitish-gray plant, frequent, 5.11.1956, *Guest, Rawi and Rechinger* 16023A (R8159) ; near Salaibiyat al-Hamir, c. 35 km. S. by W. of Ur, c. 20 m., on sandhills, occasional, 6.11.1956, *do.* 16055 (R8186B) ; Southern Desert, 10 km. S. of Khidr al-Mai, 195 m., silty soil with sparse gravel surface, grey shoots, colloquial name ijrum, 8.11.1956, *do.* 16119 ; between Shithatha and Rahhaliya, 60 m., sandy gravelly subdesert, flowers pink, common, 12.11.1956, *Rawi and Alkas* 16322, 16327 ; Southern Desert, N. of Khidr al-Mai (on way to Mughazil), 20.2.1955, *Serkahia* 16475.

The following is more doubtfully in this species : Southern Desert, Al-Batin (Kuwait Border, c. 100 km. S.E. of Busaiya), c. 150 m., compact sandy soil, abundant, 28.3.1956, *Guest and Mahallal* 15250.

Eig (in Pal. Journ. Bot. J. ser., **3,** 135 : 1945) records *A. articulata* from 27 km. W. of Ramadi. Burtt and Lewis (in Kew Bull. 383 : 1954) distinguish this from *Haloxylon salicornicum*, which it superficially much resembles as follows :—

A. Shoots less thick and fleshy ; seed horizontal ; staminodes entirely thin and membranous, narrowly oblong-elliptic with acute tips *H. salicornicum*

A¹. Shoots thicker more fleshy ; seed vertical ; staminodes membranous orbicular-oblong with obtuse almost truncate thickened opaque tips *A. articulata*

Anabasis setifera *Moq.* Chenopod. Enum. 164 : 1840.

24 km. on the way to Nukheib-Shabicha, frequent, 17.10.1955, *Serkahia* 15124 ; c. 28 km. W. by S. of Samawa, 15 m., slightly gravelly sandy desert, occasional, 5.11.1956, *Guest, Rawi and Rechinger* 16023B (R8157) ; Southern Desert, c. 55 km. E.S.E. of Busaiya, 165 m., silty soil (perhaps liable to occasional flooding ?), green longitudinally grooved shoots, yellow flowers, eaten by camels and sheep, occasional, 8.11.1956, *do.* 16106 ; Southern Desert, 2 km. S. of Khidr al-Mai, 180 m., silty, yellow or deep reddish pink, abundant, colloquial name sharan, 8.11.1956, *do.* 16115, 16116 ; c. 10 km. S. of Khadr al-Mai, 195 m., silty soil with sparse gravel cover, excellent grazing for camels and sheep, abundant, 8.11. 1956, *do.* 16121 ; c. 12 km. W. by S. of Karbala, c. 60 m., desert pavement with vertical gypsum plates outcropping, rare, 20.11.1956, *Guest, Rawi and Rechinger* 16153B (R8313) ; Bahr al-Milh c. 30 km. W. by S. of Karbala, c. 20 m., very salty soil with high water table, by S. shore lake, liable to flooding, rosy, frequent, colloquial name ghalfah ?, 20.11.1956, *do.* 16165 ; near Rahhaliya, c. 20 km. N. by W. of Shithatha, c. 60 m., gypsiferous desert alluvium rather saline, with high water table as indicated by nearby clump of wild date palms, frequent, 21.11.1956, *do.* 16189 ; 10 km. N. of Rahhaliya (c. 55 km. S. of Ramadi) c. 90 m., gypsiferous desert pavement with very fine gravel, white, abundant, 21.11.1956, *do.* 16191 (R8356) ; c. 30 km. S. of Ramadi, c. 100 m., gypsum desert gravel, frequent, white, 21.11.1956, *do.* 16196 (R8349) ; 20 km. N.W. of Karbala, 40 m., sandy loam soil with gypsum, flowers creamy pale yellow, common, 12.11.1956, *Rawi and Serkahia* 16279 ; between Shithatha and Rahhaliya, 60 m., flowers pale, common, colloquial name sheran, 12.11.1956, *Rawi and Alkas* 16321.

The following specimens are more doubtfully in this species : Near Nukheib (35 km. E. of), c. 250 m., subdesert, low woody perennial shrublet, 12.4.1955, *Guest, Rawi and Long* 14045 ; 75 km. W. of Rutba (Wadi al Walg), 640 m., clay soil, woody plant, rare, 11.3.1955, *Rawi* 14712 ; Southern Desert, 8 km. E.S.E. of Busaiya, c. 150 m., compact sandy soil, relished by livestock, colloquial name sha'rán, 28.3.1956, *Guest and Mahallal* 15236 ; Southern Desert, between Zubair and Busaiya, common, 15.2.1956, *Serkahia* 16455.

Eig (l.c. p. 136) records *A. setifera* from Jaliba and from 76 km. W. of Basra. The typication and synonymy are discussed by Burtt and Lewis in Kew Bull. 378 (1954). Zohary has collected this species in the Southern Desert between Ar Rumail and Luqait, Jaliba (in Proc. Linn. Soc. 107 : 1941).

The bristles at the apices of the leaves are readily deciduous and may not be present at all in some specimens.

[**Arthrocnemum** see **Halocnemum**].

Atriplex *L.*

A. Plant shrubby, perennial

[B. Shrub stout, 1–3 m. high ; inflorescence naked ± terminal, a large false panicle . . . . . *A. halimus* L.]

B¹. Shrub not very stout, small or at most 1 m. high ; inflorescence loosely glomerulate generally leafy, false spike or false panicle *A. leucoclada* Boiss.

A¹. Plant annual

C. Bracteoles (of at least part of female flowers) rounded or cordate, thin membranous, mostly fine-nerved, entire at margin, free to base, without appendages, smooth . . . . . *A. hortensis* L.

C¹. Females bracteoles mostly not rounded, mostly hard membranous or hardened, seldom entire at margin, ± accrescent, generally with appendages

D. Female bracteoles cordate at base

E. Female bracteoles up to 8 mm. long, reticulate on surface, margin subentire or irregularly sinuate ; branches alternate *A. dimorphostegia* Kar. et Kir.

E¹. Female bracteoles 8–10 m. long, not reticulate on surface, margin regularly and obtusely 7-sinuate ; branches opposite *A. flabellum* Bunge

D¹. Female bracteoles ± cuneate attenuate or truncate at base

F. Leaves c. 2 cm. long, c. 2 cm. wide, 3-angled-cordate the larger directed towards the base ; female bracteoles deltoid-campanulate, widest above the middle, without appendages *A. thunbergifolia* (Boiss. et Noë) Boiss.

F¹. Leaves not usually as above, when as above then female bracteoles widest at or below middle with appendages

G. Plant larger (up to 1·5 cm. tall) with yellowish membranous peeling stem ; glomerule slender c. 3 mm. in diam. ; female bracteoles small c. 1 mm. long, spheroid-oval, only seen in mixed glomerules (not isolated axillary) *A. olivieri* Moq.

G¹. Glomerules and female bracteoles larger, generally deltoid more rarely 3-lobed ; stem not peeling

H. Leaves generally less dentate ; seed dark brown, c. 1 mm. diam. . . . . *A. lasiantha* Boiss.

H¹. Leaves generally conspicuously dentate ; seed brown, 1·5–2 mm. diam. . . . . *A. tatarica* L.

This key is taken, with minor alterations, from P. Aellen " Die Atriplex-Arten des Orients " in Engl. Bot. Jahrb. **70,** 1–66 (1939).

Atriplex dimorphostegia *Kar. et Kir.*

Handel-Mazzetti p. 141 (1912) records this from " An den Dammen des Kanales Nil bei Kwerisch (Babylon) (Nr. 879) ". Nábělek p. 9 (1929) records it from the same locality.

Distr. Egypt, Pal., Arab., Pers., Afghan., Baluch., N. Asia.

Atriplex flabellum *Bunge ex Boiss.* (*Obione flabellum* (Bunge ex Boiss.). *Ulbrich* in Pflanzenfam. ed. 2, **16C,** 506 : 1934).

Aellen (in Verh. Nat. Gesell. Basel **49,** 137 : 1938) cites "near Bagdad, Lazar : Pl. of Iraq no. 156 (Chicago ; ?, ohne Früchte) " as this species.

Obione Gartn. is sometimes kept as a separate genus from *Atriplex.* In *Obione* the fruit is stated to be partly or entirely embedded in the bracteoles which are often united to the apex while in *Atriplex* the fruit is only inserted between the bracteoles which are only united at the base or to the middle.

Distr. (of *A. flabellum*, after Aellen). Persia, Afghan, Turkmenistan, Usbekistan, China.

[**Atriplex halimus** *L.* or **A. nummularia** *Lindl.* ?

Abu Ghraib, Baghdad liwa, 50 m., irrigated somewhat saline alluvium, subdesert climate, fls. greenish-yellow, 15.7.1947, 11.2.1947, *Gillett* 8419, 10160.

Gillett 8419, 10160 resemble *Atriplex nummularia* Lindl. *Guest* 3313, cultivated at Rustam, which bears the collector's notes " originally introduced from Australia ". Australian material of *A. nummularia* has female bracteoles 3–8 mm. long, while Oriental material of *A. halimus* has them 2–5 mm. long. In flower the two species resemble each other closely. Unfortunately the 'Iraq material does not show any fruit. *A. halimus* has been recorded from Jordan (Aellen l.c. p. 12) but not from 'Iraq.]

Atriplex hortensis *L.* subsp. **nitens** (*Schukhr*) *Pons*

Abu Ghraib Farm, 14.11.1956, *Rawi* 16330.

Boissier (p. 5, p. 908) cites a cultivated specimen from Baghdad collected by Noë.

Aellen (p. 26) cites Noë's specimen under subsp. *nitens* which is distinguished by at least the upper leaves being white or grey scaly on the undersurface. In subsp. *eu-hortensis* Aellen all the leaves are glabrous on both surfaces.

The following specimen is near *hortensis* L.

Baghdad, Abu Ghraib, damp weedy irrigated ground, plentiful, 24.10.1954, *Haines* W9.

Atriplex lasiantha *Boiss.* (*A. tatarica* L. var. *virgata* Boiss. Fl. Or. **4,** 910 : 1879 partly).

In ruderatis, Mosul, 1867, *Haussknecht* ; in saxosis aridis montis Gara Kurdistaniae, 1841, *Kotschy* 353.

Haussknecht's specimen has no appendages on the female bracteoles. Aellen's description l.c. p. 45 states that this species may be with or without appendages, although his key p. 6 distinguishes *A. lasiantha* as appendages mostly well-developed, in the upper part toothed, densely spreading and *A. tatarica* as appendages, when present, forming a ± more or less loose crown of separate tubercles. The seed characters given in the key to the species on p. 474 are taken from Aellen as the fruiting material from 'Iraq is inadequate to form any conclusions on the value of this character. Possibly *A. lasiantha* is only a variety of *A. tatarica*.

Atriplex olivieri *Moq.*

Mts. S.E. of Serwa, Arbil liwa, 1760 m., metamorphic rocks, *Astragalus* zone, occasional, fl. yellow, 9.8.1947, *Gillett* 9692 ; Jabal Baradost near Diana Rowanduz, 28-29.6.1934, *Field and Yussef Lazar* 907 ; Sarsing, 4500 ft., dry rocky slopes, light scrub, above gorge, 10.7.1955, *Haines* W460.

Field and Yussef Lazar 907 is cited by Aellen (p. 38).

Distr. 'Iraq, Pers.

Atriplex thunbergifolia (*Boiss. et Noë*) *Boiss.* Fl. Or. **4,** 911 : 1879. (*Obione thunbergifolia* Boiss. et Noë Diagn. Ser. 2, 4, p. 74 : 1859). Kut on the Tigris, 1851, *Noë* 993 (syntype).

Only known from this gathering and *Noë* 63 from the same locality.

Distr. 'Iraq.

Atriplex sp.

Abu Ghraib, 40 m. irrigated alluvium now fallow, 15.7.1947, *Gillett* 8419.

Material insufficient for more accurate identification.

Bassia *All.*

A. Perianth hairy but spines of perianth visible when in fruit

B. Perianth-spines hooked, about as long as width of rest of fruit ; stem and leaves hirsute or villose . *B. hyssopifolia* (Pall.) Kuntze

B¹. Perianth-spines straight, longer than width of rest of fruit ; stem and leaves densely villose . . . . . *B. muricata* (L.) Murr.

A¹. Perianth very hairy completely hidden by long lanate hairs *B. eriophora* (Schrad.) Aschers.

Bassia eriophora (*Schrad.*) *Aschers.* (*Kochia eriophora* Schrad.).

Anthony p. 296 (1935) records this from Jabal Hamrin as *B. latifolia* Asch. et Schwein. The densely lanate inflorescence gives this species somewhat of the appearance of an *Evax* or *Micropus*, but our plant differs in a taller and more erect habit. Burtt and P. Lewis in Kew Bull. 380 : 1954 have a note on this species.

Bassia muricata (*L.*) *Aschers.* (*Kochia muricata* (L.) Schrad. ; *Salsola muricata* L.).

Southern Desert, Al-Ichrishi, 35 km. E. by N. of Busaiya, c. 115 m., rolling sandy plain with low flat dunes and sand ridges, eaten by camels not relished by sheep, colloquial name khurradh, yellow, frequent, 15.4. 1955, *Guest and Rawi* 14192 ; Southern Desert, c. 170 m., c. 55 km. S.E. by E. of Busaiya, frequent, 16.4.1955, *Guest and Rawi* 14270 ; Baghdad–Karbala Road, sandy hollow on open desert, *Haines* W663.

There is some division of opinion over the correct authority for *Bassia muricata*. The Index Kewensis attributes the combination to All. Misc. Taur. iii, t. 4. Post Fl. Syr., Pal. and Sinai **2,** 438 (1933) gives *Bassia muricata* (L.) Murr. 1774. The only work of Murray's in 1774, which has been traced, is the 13th edition of Linn. Syst. Veg. where *Bassia longifolia* only is given (p. 367). Ulbrich in Pflanzenfam. **16c,** 530 (1934) gives the authority and reference for the genus as Allioni Miscell. Taurin. **3,** t. 4, fig. 2 (1766), but the species *Bassia muricata* is attributed to (L.) Ascherson which Allioni is stated to have as *Bassia* sp. I have not seen the work of Allioni in question and follow Ulbrich on this point.

Beta vulgaris *L.*

A. Perianth-lobes generally only ± the length of the radius of the pericarp, shortly triangular, obtuse, not or rarely cucullate at base, only rarely cartilagineous . . . . . ssp. *maritima* (L.) Thell.

B. The uppermost glomerules of inflorescence provided with bracts, bracts considerably larger than the glomerules ssp. *maritima* var. *foliosa* (Ehrenb.) Aellen

B¹ The upper and uppermost glomerules of inflorescence with inconspicuous bracts . . ssp. *maritima* var. *glabra* (Del.) Aellen

A¹ Perianth-lobes longer than the rhachis of the pericarp, subulate spathulate or narrowly spoon-shaped, cartilagineous and cucullate at base

C. Perianth-tubes ± spathulate, markedly membranous at margin ; glomerules almost always 2-flowered . ssp. *lomatogonoides* Aellen

C¹ Perianth-lobes subulate or slightly spoon-shaped, ± triangular at base cartilagineous . . . . . ssp. *vulgaris* (L.) Thell.

The key above is from Aellen in Ber. Schw. Bot. Ges. **48,** 472–473 (1938).

Beta vulgaris *L.* subsp. **lomatogonoides** *Aellen*

Aellen l.c. p. 478 cites a specimen from : Gatt al Dwat, near Amara, 1934, *Field and Yussef Lazar* 13.

Beta vulgaris L. ssp. **maritima** *(L.) Thell.* var. **foliosa** *(Ehrenbg.) Aellen*

Sharaban, old fields, very common, 24.4.1920, *R. J. D. Graham* ; Karada, along water courses, 30.3.1920, *R. J. D. Graham* ; Baghdad West, May 1929, *F. A. Rogers* 0305 ; Rustam, 7.5.1932, *Yussef Lazar* 3440 ; Baghdad, Karadat Mariam, frequent on dry roadside, 13.5.1955, *Haines* W789.

Aellen l.c. p. 475 cites a specimen : Babylon in arvis, 1893, *Bornmüller* 624.

Beta vulgaris *L.* subsp. **maritima** (*L.*) *Thell.* var. **glabra** (*Del.*) *Aellen.*

In field near the Band of Hinaidi, native name hamaidh, 25.4.1933, *Field and Lazar* 212 ; Rustam, May 1929, *Guest* 265 ; Shamiya, fodder plant, colloquial name milaih, June 1932, *Qaimaqam of Shamiya* 2357 ; Baghdad in fields at Rustam, colloquial name hummaidh, 25.4.1933, *Lazar* 3908 ; 20 km. N. of Amara, 10 m., irrigated field, common, 21.3.1955, *Rawi* 15019 ; same loc., 20 m. waste land, common, 21.4. 1955, *Rawi* 15040.

Field and Lazar 212 is cited by Aellen in Ber. Schw. Bot. Ges. **48,** 476 (1938).

The following two specimens have the upper part of the inflorescence stripped of fruits so that it is impossible to name their variety but they should be included in ssp. *maritima* :

Daltawa, on salty land, colloquial name silaijah (= " little spinach "), 26.5.1932, *Guest* 2513 ; Rustam, 1.6.1932, *Lazar* 3441.

Beta vulgaris *L.* subsp. **vulgaris**

Rustam, in gardens, cultivated as a vegetable, leaves eaten like spinach, 17.5.1932, *Guest* 1776 ; 4 km. W. of Hit, 80 m. in *Triticum* cultivation under irrigation, soil slightly saline, flower greenish yellow, native name silaq, 25.3.1947, *Rawi and Gillett* 6864 ; Baghdad West, 40 m., flowers green, 16.4.1948, *Gillett* 10723.

Beta vulgaris *L.* s. l.

Baghdad, *Colvill* ; Karada Billett 47, cultivated, 22.3.1920, *R. J. D. Graham* ; Rustam, Apr. 1930, *Guest* 249 ; 12 miles N. of Baghdad, Rustam, *Cowan and Darlington* 70 ; Kut al-Amara, c. 20 m., in rather saline ground near hut, flowers greenish, colloquial name siliq, 16.3.1947, *Gillett* 6583.

These specimens are too immature to be placed in any subspecies.

Bienertia cycloptera *Bunge*

Basra, Oct. 1929, *Guest* 280 ; Southern Jazira (about 50 km. N.E. Ramadi), c. 40 m., dry saline depression (Chenopodiaceum), pale grape-green fruits, 16.11.1954, *Guest, Rawi and Nuri* 13549 ; same loc., dark bluish-green fruits, *do.* 13550 ; same loc., erect bush 40–50 cm., blackish fruits, *do.* 13558 ; same loc., *do.* 13558A ; *do.*, reddish-green grape-like fruits, *do.* 13561 ; same loc., dry sandy wadi bed, erect herb, 20–25 cm., transparent white perianth, grape-green fruits, *do.* 13573 ; Baghdad ?, 1955, coll. ?, 14533 ; 18 km. W. of Samawa, c. 40 m., margin of saline depression and sand hills, abundant, 26.3.1956, *Guest and Mahallal* 15207A ; c. 12 km. W.S.W. of Samawa, 15 m., saline flats, bright grape-green fruits, frequent, 5.11.1956, *Guest, Rawi and Rechinger*, 16009A (R8153) ; c. 27 km. W. by S. of Samawa, 15 m., saline flat, "grape" yellowish green, frequent, 5.11.1956, *do.* 16022 ; Bahr al Milh, c. 30 km. W. by S. of Karbala, c. 20 m., very salty soil with high water table by S

shore of lake, liable to flooding, red pink or almost white turning black when ripe, occasional, 20.11.1956, *do.* 16163 (R8333) ; same loc., c. 35 m., higher ground adjacent to flats on margin of lake, grape-green, white pink or red, black when ripe, frequent, 21.11.1956, *do.* 16185 ; Salaibiya, c. 25 km. S. of Ur, c. 10 m., extensive dry marshlands inundated in winter, soft powdery saline surface with hard subsoil, 6.11.1956, *do.* 16037 (R8177) ; 30 km. W. of Darragi between Nasiriya and Samawa, c. 15 m., sandy heavy salty loam and sandy saline soil, fruit greenish, rare, colloquial name hattales, *Rawi and Alkas* 16234, 16242 ; near Shithatha, 40 m., salty loamy soil, fruit pink purple, common, 12.11.1956, *Rawi and Serkahia* 16300 ; between Shithatha and Rahhaliya, 60 m., salty places, fruit purple, common, 12.11.1956, *Rawi and Alkas* 16319.

This plant is represented from Kuwait : Kadhima, south of bay of Kuwait, 15.10.1935, *Dickson* 252A.

Distr. Kuwait, Persia, Transcaspia, N. Asia (Turgai).

Chenopodium *L.*

A. Plant without stalked glands ; leaves not pinnatisect

B. Inflorescence axis and perianth glabrous rarely ± mealy and then not enclosing the fruit

C. Fruiting perianth not fleshy, green . . . . . *C. urbicum* L.

C! Fruiting perianth fleshy turning scarlet *C. foliosum* (Moench) Asch.

B! Inflorescence axis and perianth mealy at least when young ; fruit usually entirely or almost entirely enclosed by perianth

D. Leaves entire or almost so

E. Fish-like smell ; leaves ovate-rhombic very white *C. vulvaria* L.

E! No fish-like smell ; leaves narrower usually longer than wide, green or sparsely mealy . . . . . *C. album* L.

D! At least some leaves toothed or lobed

F. Leaves toothed but not distinctly 3-lobed

G. Inflorescence leafy almost to top, its branches short, numerous, divaricate ; pericarp strongly adherent ; seeds dull, with sharp rather prominent keel ; testa densely covered with small pits . . . . . *C. murale* L.

G! Inflorescence usually leafless in upper part, branches usually long and themselves little branched ; seeds shining, obtuse or subacute at margin, but keel not prominent ; testa never densely pitted

H. Leaves (except juvenile ones following the cotyledons) distinctly longer than broad, normally by at least 1½ times ; stem often more or less red ; branching commonly erect or suberect ; testa furrowed, otherwise almost smooth . . . . . *C. album* L.

H¹ Leaves (at least median and lower cauline) nearly or quite as broad as long, rather small, up to about 5·4 cm. long ; stems rarely red ; branching commonly divergent; testa marked with radial furrows more closely than in *C. album*, also with minute roughnesses in between ; inflorescences normally very mealy . *C. opulifolium* Schrad.

F¹ At least some of the leaves distinctly 3-lobed

I. At least the larger stem leaves as broad as or broader than long, lateral lobes short ; plant usually grey-green ; stems rarely red . . . . . *C. opulifolium* Schrad.

I¹ Leaves usually markedly longer than broad ; seeds with close radially elongate pits on testa . . *C. ficifolium* Sm.

A¹ Plant pubescent with stalked glands ; leaves pinnatisect or pinnatifid . *C. botrys* L.

This key is based on those given by Clapham, Tutin and Warburg Fl. of the British Isles 344–346 (1952) and Brenan Flora Trop. E. Africa Chenopodiaceae 4–6 (1954). I am indebted to Mr. Brenan for naming the specimens of *Chenopodium* from 'Iraq as well as for advice on the key.

Chenopodium urbicum *L.*

Darband near Rayat, 1150 m., damp place by garden, eaten by animals, green fruit, 20.9.1956, *Guest & Husham* 15885.

Zohary p. 46 (1950) records this from the Rowanduz Area.

Cornulaca *Delile*

A. Annual

B. A few ribbon-like woolly hairs (split scales), longer than the leaves, in the angles of the leaves on the young growth . *C. aucheri* Moq.

B¹ The long hairs absent ; short, equal-lengthed tufted hairs in the leaf axils . . . . . *C. leucantha* Charif et Aellen

A¹ Perennial

C. Leaves (1–) 2–4 cm. long forming thin, subulate thorns *C. setifera* (DC.) Moq.

C¹ Leaves triangular-subulate with spreading, roundish base to subulate-acicular, stiff-herbaceous to hard thorny ; thorn generally 3–10 mm. long ; branches generally elongate . *C. monacantha* Del.

This key is taken from Aellen in Verhand. Nat. Gesell. Basel **61,** 159 (1950).

Cornulaca leucantha *Charif et Aellen*

N. of Mosul, Oct. 1929, *Dinsmore* 0399 ; Thirthar 40 km. N.N.E. of Ramadi, Duleim liwa, 20 m., subdesert, fl. purplish prickly leaves, 8.9.1947, *Gillett* 9900 ; 43 km. S of Baghdad on Hilla road, subdesert, leaves prickly, stamens yellow, 1.10.1947, *Gillett* 9897 ; Nejef-Karbala, Karbala

liwa, 20 m., gypsaceous subdesert, common, 3.10.1947, *Gillett* 9967 ; Jabal Hamrin above Injana, Kirkuk liwa, 200 m., gypsaceous hills, steppe-subdesert ecotone, 27.8.1948, *Gillett* 12482 ; Musayyib, c. 25 m., sandy desert, red or yellow, native name chibchab, 15.9.1953, *Guest* 13147 ; Southern Jazira (nr. Balad), c. 35 m., alluvial plain with low gravel ridges, region of ancient Ishagi canal, 17.10.1954, *Robertson* 13470 ; Southern Jazira (about 50 km. N.E. Ramadi), c. 40 m., erect woody herb in form of branched candelabra, 16.11.154, *Guest* 13576 ; Southern Desert, 14 km. E.S.E. of Khidr al-Mai (c. 100 km. S.E. of Busaiya), c. 185 m., compact sandy soil with some gravel, stony gypsum layer at 35 cm., frequent, colloquial name chibchab, 28.3.1956, *Guest and Mahallal* 15248 ; near Jabal Hamrin, 300 ft., sandy rocks, common, 14.9.1956, *H. Ayaub* 15568 ; Jazira, c. 16 km. N.W. of Felluja, 60 m., hard gravel desert with some slightly sandy patches, occasional, colloquial name kullakhan, 16.12.1956, *Guest and Rawi* 15960 ; 2 km. W. of Karbala, c. 35 m., sandy gypsiferous desert, abundant, 20.11.1956, *Guest, Rawi and Rechinger* 16150 ; 3 km. N.W. of Abu Skhair, 25 m., subdesert region, frequent, 11.11.1956, *Rawi and Serkahia* 16263 ; 40 km. N.W. of Karbala, 40 m., sandy loam with gypsum, frequent, 12.11.1956, *do.* 16288 ; between Shithatha and Rahhaliya, 60 m., sandy gravelly subdesert, frequent, 12.11.1956, *Rawi and Alkas* 16329.

Guest 927, 3533, 3534 which I identified in " The Rustam Herbarium ", p. 446 as *C. aucheri* should be included in *C. leucantha*. *Guest* 4008 is a mixture of *C. leucantha* and *C. aucheri*.

Distr. Kuwait, 'Iraq, Persia.

Cornulaca setifera (*DC.*) *Moq.*

No specimens seen but Aellen l.c. p. 163 cites specimens from between Aleppo and Baghdad (*Olivier*) and between " Bsera und Fden, 1907 *Herzfeld* ! (H. Del.)".

Distr. 'Iraq, Syria.

Cornulaca sp.

Southern Desert, about 45 km. S.E. by E. of Busaiya, c. 150 m., rather sandy "haswa " (gravel) plain, frequent, colloquial name chibchab, 16.4.1955, *Guest and Rawi* 14259 ; Southern Desert, about 80 km. E.S.E. of Busaiya, c. 140 m., subdesert (soil type unrecorded but sandy), low woody bush about 25 cm. high, abundant, 16.4.1955, *Guest and Rawi* 14271.

These specimens show the young shoots collected in April and are not readily matched with the other material of *Cornulaca*.

Girgensohnia oppositiflora (*Pall.*) *Fenzl*

Boissier **4,** p. 967 (1879) cites " monte Sindjar Mesopotamiae (Haussk !) " Handel-Mazzetti p. 144 (1912) records a specimen from " Sandwüste bei Beled zwischen Baghdad und Samarra (Nr. 3118)".

Halimocnemis pilosa *Moq.*

This species is recorded by Zohary p. 49 (1950) from the Western Desert.

Halocharis *Moq.*

A. Appendage of anthers oblong . . . . . *H. sulphurea* Moq.

A[1] Appendage of anthers ovate, spikes and indumentum looser *H. brachyura* Eig

H. brachyura *Eig* in Pal. Journ. Bot. ser. J., **3,** 137 (1945) e descr.

This species is described from three gatherings collected on the banks of Chankula River ; 94 km. S.E. of Baghdad ; 133 km. S.E. of Baghdad.

Halocnemum strobilaceum (*Pall.*) *M.B.*

Shaiba, near Basra, 6.1.1929, *Rogers* 03 ; in the Jazira, in the open bed of the Wadi Tharthar near Sabka Um Rahal, 15.10.1932, *Guest* 3544 ; c. 17 km. W. by S. of Samawa, 15 m., margin of low sand dunes and saline flats with *Tamarix*, low bush 5–10 cm. high, abundant, 5.11.1956, *Guest, Rawi and Rechinger* 16011 (R8160) ; Al-Buhara, c. 25 km. W. of Samawa, c. 25 m., silty soil liable to flooding in winter near edge of salt pans, greenish low hummock forming bush 20–40 cm. high, *do.* 16026 (R8162A) ; Kuraz al-Mali, c. 15 km. E.N.E. of Jaliba Station, c. 7 m., soft saline flats on edge of marsh (arm of Hor al Hammar), hummocky bush, eaten by animals but rather poor fodder, colloquial name thillaidh, 9.11.1956, *do.* 16141 (R8254) ; Shithatha, c. 42 km. W. of Karbala, c. 40 m., low-lying marshy land with high water table, saline, abundant, colloquial name hummaidh, 20.11.1956, *do.* 16170 (R8337B) ; Shithatha, c. 45 m., saline gypsiferous flats on edge of oasis (high water table ½ m.), abundant, 21.11.1956,*do.* 16178 ; Bahr al-Milh, c. 10 km. N. of Shithatha, c. 35 m., higher ground adjacent to flats on margin of lake, occasional, 21.11.1956, *do.*, 16183 (R8344) ; near Shithatha, salty soil, flowers green yellow, common, 12.11.1956, *Rawi and Alkas* 16305 ; between Shithatha and Rahhaliya, 50 m., salty place, flower greenish yellow, common, 12.11. 1956, *Rawi and Alkas* 16316.

Arthrocnemum sp. (probably *A. glaucum* (Del.) Ung.-Sternb.) is mentioned by Guest p. 10 (1933). As *Rogers* 03 bears the identification " cf. *Arthrocmemum fruticosum* (L.)" in Mr. A. R. Horwood's writing, this is very probably the misidentification on which *Arthrocnemum* has been recorded in 'Iraq.

Halopeplis pygmaea (*Pall.*) *Bunge* (*Salicornia pygmaea* Pall. Ill. **1,** t. 2, fig. 2 : 1803).

Hit, wet salt marsh, colloquial native thilaidh, 15.10.1932, *Guest* 3547 ; Bahr al-Milh, c. 10 km. N. of Shithatha, 35 m., higher ground adjacent to flats on margin of lake, reddish-green, abundant, 21.11.1956, *Guest, Rawi and Rechinger* 16182 (R8345).

These two gatherings from 'Iraq show spikes 0·5–3·4 cm. long, 0·2–0·6 cm. wide, rounded at the apex. The material at Kew from Persia and N. Asia (Sapende Rud, 1.10.1885, *Stapf* ; Songaria, *Bunge* ; Prov. Samarkand, Tuz-Kane, 8.10.1924, *Vvedensky* 110) show spikes 0·4–1·9 cm. long, 0·15–0·4 cm. wide, rounded or somewhat tapering at the apex. As 16182 is intermediate in size and habit between *Guest* 3547 and *Vvedensky* 110 the specimens from 'Iraq are placed in this species.

Guest 3547 I previously wrongly included in *Halocnemum strobilaceum* (Pall.) M.B.

Distr. Cauc., Pers., N. Asia.

Haloxylon *Bunge*

A. Shrub or small tree 2–2·5 m. (4–5 m. ?) high ; sterile shoots elongate thin and twiggy . . . . . *H. ammodendron* (C.A.M.) Bunge

A¹ Subshrubs to 60 cm. high ; sterile shoots with shorter internodes

B. Shoots stouter ; scale leaves shortly triangular adpressed densely tomentose ring at node within scale leaves ; young growth pale grey-green in sicco . . . . . *H. salicornicum* (Moq.) Bunge

B¹ Shoots thinner ; scale leaves triangular subpatent, scale-leaves shortly tomentose within but tomentose ring not so conspicuous at nodes ; young growth dark or grey-green in sicco *H. articulatum* (Cav.) Bunge

Haloxylon ammodendron (*C.A.M.*) *Bunge* in Mém. Sav. Etr. Petersb. **7,** 468 (1851) (*Anabasis ammodendron* C.A.M. ex Ledeb. Fl. Alt. **1,** 375 (1829) ; *Haloxylon persicum* Bunge ex Boiss. et Buhse in Nouv. Mém. Soc. Nat. Mosc. **12,** 189 : 1860).

40 km. N.N.E. of Ramadi, Duleim liwa, wadi in depression with blown sand and rather saline soil, locally dominant, shrub 3 m. (said to reach 5 m., useful for firewood and camel grazing), it is being exterminated by cutting for firewood which is carried to Ramadi, large mounds of sand accumulate round base of plant, the stump of an old plant was 12 cm. diam. and 49 years old by the rings, colloquial name ghadha, 8.9.1947, *Gillett* 9902 ; Southern Desert, Al-Ichrishi (35 km. E. by N. of Busaiya), 115 m., rolling sandy plain with low flat dunes and sand ridges, small tree, 1–2 m. high, fuel and camel fodder, 15.4.1955, *Guest and Rawi* 14179 ; Southern Desert, c. 30 km. S.S.W. of Tal al-Lahm (near Ur), c. 70 m., low sandhill ranges, small tree (2 m. high) long delicate branches, greenish-red " foliage ", 27.3.1956, *Guest and Ibrahim Mahallal* 15210 ; Southern Desert, Al Umaighir (30 km. S. of Tall Lahm), c. 75 m., sand dunes (with outcrops of pink sandstone and white calcareous rocks), small tree or shrub (2 m. high), dug up for charcoal, 30.3.1956, *Guest and Ibrahim Mahallal* 15312 ; Southern Jazira, about 50 km. N.E. of Ramadi, c. 60 m., undulating sandy desert said to have been a dense extensive forest of this species 30 years ago, slender erect shrub or small tree 2–2½ m. but said to grow to 4–5 m., useful for grazing, sadly over exploited by charcoal burners, native name ghadha, 16.11.1954, *Guest, Rawi and Abd al-Karim Nuri* 13528 ; Jazira (near Millaih Thirthar), c. 50 m., sandhills near S.E. shore of lake, erect shrub 1–2 m. high, abundant, 16.12.1956, *Guest and Rawi* 15975 ; near Salaibiyat al-Hamir, c. 20 m., on sandhills, shrub 2 m. high, greenish-yellow, colloquial name ghadha, 6.11.1956, *Guest, Rawi and Rechinger* 16051 (R8188) ; c. 40 km. S. by W. of Ur near Salaibiyat al-Hamir, 25 m., small dunes on " haswa " gravel plain, abundant, 6.11.1956, *Guest, Rawi and Rechinger* 16059 (R8182) ; 30 km. W. of Darragi, between Nasiriya and Samawa, c. 15 m., on sandhill,

flowers pale yellow, height 2 m., common, colloquial name ghadha, 10.11.1956, *Rawi and Jalkas* 16245.

This species was originally described as *Anabasis ammodendron* based on the specimens :—Noor-Saisan, *Meyer* and Buchaiia between Kuwan-Darja and Jan-Darja, *Eversmann*. According to Iljin (Fl. U.R.S.S. **6,** 314 : 1936) the type is at Leningrad. In 1851 the species was transferred to the genus *Haloxylon*. In 1860 Bunge described another species under the name *Haloxylon persicum* as " differt ab H. Ammodendro foliis longioribus " based on the specimen : near Dschendak and Enarek, April 1948, *Buhse*. Iljin l.c. states that the type also is at Leningrad.

Later botanists have differed in their opinion on the value of *H. persicum*. Ulbrich l.c. p. 572 : 1934, Zohary in Pal. Journ. Bot. J. ser, **1,** 413–416 (1940) and Eig in the same journal **3,** 128 (1944) as well as Iljin l.c. p. 310 regard *H. persicum* as a separate species. On the other hand Boissier Fl. Or. **4,** 948 (1875) and Boyko in Pal. Journ. Bot. R. Ser., **7,** 30 (1949) place *H. persicum* as a synonym of *H. ammodendron*. The difference between the two species is stated by Iljin l.c. to be that while *H. persicum* has cuspidate leaves appressed to the stem, *H. ammodendron* has leaves not cuspidate, not completely developed or represented by tubercles.

The material from 'Iraq shows cuspidate leaves (9902, 15975), less markedly cuspidate leaves (16051, 16059) and leaves without cusps (16245), and the specimens at Kew from N. Asia are also variable in this respect without correlation to the size of the fruit (e.g. *Price* 168 fruit up to 7 mm. diam.; *Price* 190 fruit up to 10 mm. diam.; both gatherings have leaves without cusps).

Ripe fruit from 'Iraq is represented by 15975 ; the fruit (including the wings) is 7–10 mm. diam. Young fruit is shown by 16051, 16059 and 16245.

Distr. Pal., Persia, Afghan., Baluch., Transcaspia, Arabia, N. Asia.

Haloxylon sp.

Southern Desert, Al-Ichrishi (35 km. E. by N. Busaiya), c. 115 m., rolling sandy plain with low flat dunes and sand ridges, eaten by sheep and camels, colloquial name rimth, occasional, 15.4.1955, *Guest and Rawi* 14189 ; Southern Desert, c. 15 km. S.S.E. of Busaiya, c. 180 m., slightly sandy " haswa " (gravel) plain, low woody perennial shrublet, 16.4.1955, *Guest and Rawi* 14240 ; c. 55 km. S.E. by E. of Busaiya, c. 170 m., low woody bush, 16.4.1955, *Guest and Rawi* 14268 ; c. 80 km. E.S.E. of Busaiya, c. 140 m., subdesert, perennial bush 0·5 m. high, 16.4.1955, *Guest and Rawi* 14272 ; Jabal Sanam, (Basra-Kuwait border), 100–150 m., volcanic rocky slopes with sandy places, occasional, 17.4.1955, *Guest, Rawi and Schwan* 14382.

Too young for more accurate identification. The twigs are not unlike *H. ammodendron* but not so slender and the plant is not so tall.

Kochia *Roth*

A. Branching strict ; leaves linear or linear-lanceolate . . . . . *K. scoparia* var. *culta*

A¹ Branching divaricate ; leaves unknown . . . . . *Kochia* sp.

Kochia scoparia *Schrad.* var. **culta** *Farwell* (*K. trichophylla* Voss.).

Near Baghdad, 19.11.1934, *Yussef Lazar* 532 ; Baghdad, c. 30 m., in a garden at Hinaidi cantonment, erect herb about 1 m. high, Oct. 1929, *Jackson* 328.

Kochia sp.

Baghdad, Rifle Range, dry bank, 15.10.1954, *Haines* W14.

The leaves and lower parts are not present on this specimen. It may possibly be *K. odontoptera* Schrenk, a native of Persia, Afghanistan and N. Asia.

Noaea *Moq. ex DC.* Prod. **13,** 207 (1849).

A. Stem spines present

B. Stem and leaves glabrous *N. mucronata* (Forsk.) Asch. et Schweinf.

B! Stem and leaves ± densely scabrid puberulous . *N. kurdica* Eig

A! No stem spines . . . . . *N. tournefortii* (J. et S.) Moq.

Noaea kurdica *Eig*

Recorded by Eig in Pal. Journ. Bot. J. ser., **3,** 134 (1945) from Qara Dagh N.E. of Kanitacht and Pir i Mukurun Dagh [Pir Omar Gudrun ?], 1933, *Duvdevani, Eig and Zohary.* This specimen has not been seen.

The two specimens cited below are somewhat scabrid on the leaves and stems but otherwise are very like *N. mucronata.* If these really are *N. kurdica* Eig then it is probably only a variety of *N. mucronata.*

Mandali (Kauma Sang), 9.5.1930, *Guest* 795 ; Jabal Hamrin above Injana, Kirkuk liwa, 200 m., gypsaceous hills, steppe-subdesert, perianth tinged lilac, common, 27.8.1948, *Gillett* 12481.

Noaea tournefortii (*Jaub. et Spach*) *Moq.*

In rupestribus montis Gara Kurdistaniae ad cacumine usque, 27.7. 1841, *Kostchy* 346 (iso-type, Kew and B.M.) ; Khalana, 1500 m., on the hillside, stem and leaves pink, rare, colloquial name gasurik, 30.6.1954, *Rawi* 13804 ; Sarsing, 5500 ft., upper bare slopes of mountain, 9.7.1955, *Haines* W 432.

[**Petrosimonia brachiata** (*Pall.*) *Bunge*

Handel-Mazzetti p. 144 (1912) cites a specimen " Auf nacktem Salzboden am See El Chattunije (Nr. 1643)." Zohary p. 49 (1950) cites only Handel-Mazzetti's specimen as from 'Iraq. Chattuniye (Khatunie) is in Syria near the western end of Jabal Sinjar].

Salsola *L.*

A. Leaves spiny, alternate ; annual . . . . . *S.* near *kali* L.

A! Leaves not spiny

B. Leaves opposite ; perennial . . . . . *S. longifolia* Forsk.

B¹ Leaves alternate

C. Leaves reduced to scales ; perennial . . *S. subaphylla* C.A.M.

C¹ Leaves not reduced to scales

D. Leaves flat

E. Leaves glabrous, decurrent or semiamplexicaul

F. Leaves ovate . . . . . *S. auricula* Moq.

F¹ Leaves lanceolate . . . . . *S. lancifolia* Boiss.

E¹ Leaves hairy, linear, adpressed pubescent *S. canescens* (Moq.) Boiss.

D¹ Leaves ± terete or flattened only on upper surface except at their bases

G. Leaves and twigs glabrous . . . *S.* near *glauca* M.B.

G¹ Leaves and twigs ± hairy

H. Bracts and bracteoles acute often deflexed at apex, young leaves and young stems spreading pubescent ; perennial *S. hierochuntica* Bornm.

H¹ Bracts and bracteoles obtuse or rounded

I. Perianth-teeth above wings ± farinose ; twigs, bracts and leaves farinose as well as pubescent or villose ; annual

J. Fruit (including wings) 9–12 mm. diam. ; leaves often larger . . . . . *S. jordanicola* Eig

J¹ Fruit (including wings) 4–8 mm. diam.; leaves up to 6 mm. long . . . . . *S. inermis* Forsk.

I¹ Perianth-teeth above wings not farinose ; annual or perennial

K. Young leaves, bracts and bracteoles with fine silky adpressed hairs ; fruit (including wings) 4–6 mm. diam. ; perennial . . . . *S. cyclophylla* Baker

K¹ Hairs on leaves etc. not adpressed

L. Vegetative parts lanate ; bracts larger than 2 mm. long

M. Leaves acute at apex ; annual *S. gossypina* Bunge

M¹ Leaves obtuse ; perennial

N. Bark not splitting on twigs ; twigs thicker ; bracts, bracteoles less densely lanate ; fruit (including wings) 15–18 mm. diam. *S. crassa* M.B.

N¹ Bark splitting on lower part of twigs ; twigs more slender ; bracts etc. densely evenly white lanate ; fruit unknown . *Gillett* 12479 etc.

L! Vegetative parts pubescent or villose

O. Bracts 1·5–2 mm. long

P. Perennial

Q. Fruit (including wings) 6–10 mm. diam. *S. dendroides* Pall.

Q! Fruit (including wings) 4–6 mm. diam. *S. baryosma* (Roem. & Schultes) Dandy

P! Annual

R. Perianth teeth obtuse . . *S. autrani* Post

R! Perianth teeth acute

S. Fruit (including wings) 7–9 mm. diam. *S. volkensii* Asch. & Schw.

S! Fruit (including wings) 9–12 mm. diam. *S. incanescens* C.A.M.

O! Bracts 2 mm. long or more ; perennial ; lower leaves generally present when in fruit

T. Leaves up to 1 mm. wide *S. vermiculata* L. subsp. *villosa*

T! Leaves wider ? . . . . . *S. rigida* Pall.

Although *Aellenia* is here included in *Salsola*, some botanists prefer to regard the two as separate genera. The differentiating characters given below are from Aellen in Nat. Ges. Basel **61,** 175 (1950).

1. Lower tube-like part of perianth membranous to slightly hardened (when woody, then bract and bracteoles also hardened) ; base of perianth narrowed, not truncate [gestutzt] ; style narrow or in the lower part slightly conic and then gradually and concave passing into the ovary. Stigma narrow, not widened towards apex . *Salsola* L.

1*. Lower tube-like part of perianth becoming bone-hard and closed [geschlossen] ; base of perianth broadly truncate ; central ribs of the perianth-lobes forming a 5 rayed star on the basal surface of the tube ; between the rays 5 distinct pits ; margin of the surface swollen and enlarged ; style in lower part thick, ovoid half-globose, clearly distinct [abgesetzt] from the lower embryo —containing part of the ovary *Aellenia* Ulbrich (emend. Aellen)

Salsola auricula *Moq.* var. **acutifolia** (*Moq.*) *Boiss.* Fl. Or. **4,** 958 : 1879 (*Aellenia auricula* (Moq.) Ulbrich var. *acutifolia* (Moq.) Ulbrich).

Nábělek p. 11 (1929) collected this : " Cherr-e-Nemek in monticulis Kuh Beijât (Gebel Hamrin) inter Deilerun et oppidum Amara ad Tigridem 27.III.1910 (Nr. 83)".

Salsola autrani *Post*

Eig in Pal. Journ. Bot. J. ser., **3,** 129 (1945) cites specimens : from 'Iraq : Syrian Desert, 130 km. W. of Rutba, 1933, *Eig* ; 70 km. W. of Rutba, 1933, *Eig, Feinbrun and Zohary* ; 4 km. E. of Kirkuk, 1933, *Eig, Feinbrun and Zohary.*

Salsola baryosma (*Roem. et Schultes*) *Dandy* (*Chenopodium baryosmum* Roem. et Schultes Syst. Veg. **6,** 269 (1820) ; *S. foetida* Del. nomen nud., Boiss. Fl. Or. **4,** 961 (1879)).

C. 12 km. W.S.W. of Samawa, 15 m., saline flats, frequent, 5.11.1956, *Guest, Rawi and Rechinger* 16010 (R8150) ; c. 17 km. W. by S. of Samawa, 15 m., margin of low sand dunes and saline flats, fishy smell, frequent, 5.11.1956, *do.* 16013 ; near Salaibiyat al-Hamir, c. 35 km. S. by W. of Ur, c. 20 m., on sandhills, 6.11.1956, *do.* 16052 (R8193) ; Wadi al-Ubaiyidh, c. 22 km. W. by S. of Karbala, c. 40 m., sandy places on floor of Wadi, frequent, 20.11.1956, *do.* 16159 (R8326) ; near Shithatha, c. 8 km. E. = c. 38 km. W. of Karbala, colluvial soil (gravelly alluvium), occasional, 20.11.1956, *do.* 16169 (R8352) ; 30 km. W. of Darragi between Nasiriya and Samawa, c. 15 m., heavy salty loam, woody stem, rare, 10.11.1956, *Rawi and Alkas* 16231, 16232, 16233 ; 20 km. W. of Darragi, 10 m., saline soil desert region, flowers white-green, frequent, 10.11.1956, *Rawi and Serkahia* 16253 ; 20 km. N.W. of Karbala, 40 m., sandy salty soil, common, 12.11.1956, *do.* 16281 ; 50 km. N.W. of Karbala, 40 m., salty sandy soil, frequent, 12.11.1956, *do.* 16298.

Boissier describes the leaves of this species as " orbiculatis " but they appear to be shortly filiform in at least some of the 'Iraq material (e.g. 16169). Burtt and P. Lewis in Kew Bull. 384 : 1954 have notes on this species.

Distr. Sinai, Arabia, S. Persia, Afghan., Baluch., Egypt, N.W. India, N. Africa, Senegal.

Salsola near **baryosma** (*Roem. et Schultes*) *Dandy*

Near Rahhaliya, c. 20 km. N. by W. of Shithatha, c. 60 m., gypsaceous desert alluvium rather saline with high water table as indicated by clump of palms nearby, frequent, 21.11.1956, *Guest, Rawi and Rechinger* 16190 ; 3 km. N.W. of Abu-Skhair, 15 m., sandy gravelly subdesert, frequent, 11.11.1956, *Rawi and Serkahia* 16261 ; 30 km. W. of Darragi between Nasiriya and Samawa, 15 m., heavy salty loam, melon then fishy smell, flowers yellow, rare, 10.11.1956, *Rawi and Alkas* 16236.

The following gathering is also related to *S. baryosma* :—Near Nasiriya, c. 10 km. S.E. of Ur, alluvial plain by roadside, white, occasional, 6.11. 1956, *Guest, Rawi and Rechinger* 16031 (R8178).

Salsola canescens (*Moq.*) *Boiss.* Fl. Or. **4,** 963 (1879) (*Noaea canescens* Moq. ex DC. Prodr. **13,** 2, 208 : 1849).

In cacumine montis Gara Kurdistaniae orientem versus frequens, 1841, *Kotschy* 346 (syntype Kew and B.M.).

The name *Salsola canescens* Desf. Tabl. ed. 1, 41 (1804) is a nomen nudum. Kotschy's specimen cited above has a printed description with the name " *Salsola tomentosa* Spach " and as a synonym " *Halimocnemis tomentosa* Moq.-Tandon Chenopod. Enum. p. 151 " 1840. The original description of *H. tomentosa* Moq. is based on a specimen collected in Persia near Teheran ; the leaves are described as " oblongis " which does not suggest *Salsola canescens.* Boissier Fl. Or. **4,** 964 (1879) treats *Halimocnemis tomentosa* Moq. as a synonym of *Salsola aurantiaca* Bunge and cites a specimen " ad Teheran (Bél !)" which may be the type. The

name " *Salsola tomentosa* Spach ", therefore, is only a misidentification and not the earliest name for *Salsola canescens* (Moq.) Boiss.

The following specimen is possibly *S. canescens*, but the material is rather inadequate :

Jabal Hamrin near Injana, c. 200 m., sandstone hills, occasional 3.5.1956, *Guest* 15550.

Salsola crassa *M.B.*

Southern Jazira (about 50 km. N.E. Ramadi), c. 40 m., dry sandy wadi bed and dry saline depression, (Chenopodiaceum) erect herb, 30–40 cm. high, rosy pink or pinkish-brown perianth, 16.11.1954, *Guest, Rawi and Nuri* 13548, 13556, 13570 ; c. 18 km. W. by S. of Samawa, 15 m., low-lying sandy-loam flat apparently liable to flooding, perianth pink white and rosy red, frequent, 5.11.1956, *Guest, Rawi and Rechinger* 16016 (R8166A) ; Shithatha, c. 42 km. W. of Karbala, c. 40 m., low-lying marsh land with high water table, saline, dull pink, frequent, 20.11.1956, *do.* 16171 ; near Shithatha, 40 m., salty loamy soil, flowers purple, common, 12.11.1956, *Rawi and Serkahia* 16301.

Salsola cyclophylla *Baker* in Kew Bull. 340 (1894).

Southern Desert, c. 10 km. S. of Khidr al-Mai, 195 m., silty soil with sparse gravel surface, good grazing for camels and sheep, frequent, colloquial name khirît, 8.11.56, *Guest, Rawi and Rechinger* 16120 (R8235) ; Southern Desert, al-Batin (c. 15 km. E. of Khidr al-Mai), c. 160 m., sandy soil with white calcareous rock, gentle E.S.E. slope, frequent, colloquial name kharît, 9.11.1956, *do.* 16124 ; c. 28 km. W. by S. of Samawa, slightly gravelly sandy desert, abundant, 5.11.1956, *Guest, Rawi and Rechinger* 16024A (R8164) ; between Shithatha and Rahhaliya 60 m., sandy gravelly subdesert, common, 12.11.1956, *Rawi and Alkas* 16325.

This species was originally described from material from Arabia, Hadramaut, Shari Burrock Valley, near Mokalla, 200–300 feet. There are two gatherings from this locality at Kew, *Lunt* 53 should be regarded as the type as it fits the description " supra alam ovatis dense pilosis incurvatis " which does not apply to *Lunt* 54.

Salsola cyclophylla *Baker* ?

Southern Desert, 14 km. E.S.E. of Khidr al-Mai (c. 200 km. S.E. of Busaiya), c. 185 m., compact sandy soil with some gravel, stony gypsum layer at 35 cm., frequent, colloquial name kharait, 28.3.1956, *Guest and Ibrahim Mahallal* 15246 ; S. Desert, Al Umaighir (c. 30 km. S. of Tall Lahm), c. 75 m., sand dunes (with outcrops of pink sandstone and white calcareous rocks), occasional, 30.3.1956, *do.* 15310 ; S. Desert, 12 km. S.S.W. of Tall Lahm, c. 25 m., sandy gravel desert, compact bushy shrublet with bluish-grey foliage, frequent, 30.3.1956, *do.* 15314.

Probably this species but show neither flowers nor fruits.

Salsola dendroides *Pall.* (*S. verrucosa* M.B.).

This is listed by Anthony p. 297 (1935) from Jabal Hamrin and Qurna as *S. verrucosa* M.B.

Salsola near **glauca** *M.B.* (*S. glauca* M.B. = *Aellenia glauca* (M.B.) Aellen).

Southern Desert, 30 km. S.S.W. Tall Lahm (near Ur), c. 70 m., low sand hill ranges, frequent, 26.3.1956, *Guest and Ibrahim Mahallal*, 15211E. *Distr.* (of *S. glauca*). Caucasus, Persia, Transcaspia, N. Asia.

Salsola gossypina *Bunge*

This species is recorded by Anthony p. 297 (1935) from Jabal Hamrin, Mirjani.

Salsola hierochuntica *Bornm.* (*Salsola autrani* Post var. *hierochuntica* (Bornm.) Eig ; *Aellenia hierochuntica* (Bornm.) Aellen).

Hatra, on mounds of the ancient walls, 16.10.1932, *Guest* 3536 ; near Mosul, c. 230 m., (?) dry wind-blown bushes found in pits at Nimrud, 26.11.1954, *Guest* 13620.

Distr. Pal., Syria, ? Kuwait, 'Iraq.

Salsola near **incanescens** *C.A.M.*

Dujaila nr. Kut, 18 m., waste ground, papery white fls., native name milaih, 20.10. 1953, *Guest* 13104 ; Southern Jazira (about 20 km. N.E. Ramadi), c. 80 m., pebbly desert, transparent white perianth, 15.11. 1954, *Guest, Rawi and Nuri* 13537 ; Baghdad (Abu Ghraib), c. 35 m. fields waste land, transparent white perianth with blade striation, 21.10. 1954, *V. C. Robertson* 13477 ; Southern Jazira (nr. Balad), c. 35 m., abandoned cultivation in region of ancient Ishagi canal, transparent white perianth, 20.10.1954, *Baltaxe* 13480 ; Southern Jazira (near Balad), c. 35 m., alluvial plain with low gravel ridges, region of ancient Ishagi canal, fishy smell, 17.10.1954, *Baltaxe* 13476 ; S. Jazira, about 20 km. N.E. of Ramadi, c. 80 m., pebbly desert, greenish white perianth, 15.11.1954, *Guest, Rawi and Nuri* 13541 ; about 50 km. N.E. of Ramadi, c. 40 m., dry saline depression (chenopodiaceum), 16.11.1954, *do.* 13559 ; 30 km. N. of H3, association with perennial *Poa sinaica* and *Salsola*, fodder, good summer-grazing, common, 15.10.1955, *S. Y. Serkahia and Husian* 15130 ; Jazira near Trafawi (c. 37 km. N.N.W. of Felluja), 75 m., hard gravel desert, abundant, colloquial name khidraf or haitam, 16.12.1956, *Guest and Rawi* 15971 ; Bahr al-Milh (c. 30 km. W. by S. of Karbala), c. 20 m., very salty soil with high water table by S. shore of lake, liable to flooding, frequent, colloquial name ghidham, 20.11.1956, *Guest, Rawi and Rechinger* 16164 (R8328) ; 30 km. W. of Darragi between Nasiriya and Samawa, c. 15 m., sandy saline soil, flower white pinkish, rare, 10.11. 1956, *Rawi and Alkas* 16240 ; 20 km. N.W. of Karbala, 40 m., sandy loam with gypsum, flowers white, common, 12.11.1956, *Rawi and Serkahia* 16286 ; 40 km. N.W. of Karbala, 40 m., sandy loam soil with gypsum, flowers white, common, 12.11.1956, *Rawi and Serkahia* 16289.

Although Boissier Fl. Or. **4,** 954 (1875) regarded *S. nitraria* Pall. and *S. incanescens* C.A.M. as synonyms of *S. spissa* M.B. a different view is taken by Iljin in Fl. U.R.S.S. **6,** 211, 253–254 (1936) ; here *S. incanescens* C.A.M. (1831–3) is described as a plant shortly and more or less densely pilose to the top when in fruit and with a pilose perianth, while *S. nitraria*

Pall. 1803 (*S. spissa* M.B. 1806) is distinguished as a separate species glabrous in the upper half when in fruit with a glabrous perianth. Iljin also cites a specimen " HFR no. 483 ", which is represented at Kew, as *S. incanescens*. Ulbrich l.c. 564 (1934) places *S. spissa* M.B. and *S. incanescens* C.A.M. as synonyms of *S. nitraria* Pall.

Handel-Mazetti p. 142 (1912) cites a specimen from " Sandwüste bei Sumedscha zwischen Baghdad und Samarra (Nr. 3120) " as *S. incanescens* C.A.M.

Salsola inermis *Forsk.*

Near Samawa (c. 12 km. W.S.W.), c. 15 m., saline flats abundant, 5.11.1956, *Guest, Rawi and Rechinger* 16008B (R8151) ; c. 18 km. W. by S. of Samawa, 15 m., low-lying sandy loam flat apparently liable to flooding, eaten by sheep, lemon-yellow perianth, abundant, colloquial name ghidhām, 5.11.1956, *do.* 16015 (R8166B).

Eig in Pal. Journ. Bot. J. ser., **3,** 129 (1945) cites a specimen from S. 'Iraq, 13 km. E. of Ali Gharbi, *Eig and Zohary*. Handel-Mazzetti p. 142 (1912) cites specimens " Am rechten Tigrisufer zwischen Baghdad und Mossul bei der Asphaltgrube Kaijara (Nr. 3113) und bei Kalat Schergat (lg. P. Maresch) (Nr. 1143) ". Nábělek p. 10 (1929) records it from between Kifri and Kirkuk (no. 1154).

Salsola inermis *Forsk.* or **S. jordanicola** *Eig*

Southern Jazira (near Balad), c. 35 m., abandoned cultivation in region of Ishagi canal, 20.10.1954, *Baltaxe* 13479 ; same loc., pink perianth, 20. 10.1954, *Baltaxe* 13482 ; Jazira, 50 km. N. by W. of Felluja, 70 m., haswa gravel plain, frequent, 18.9.1955, *Guest, Rawi and Kreeb* 14527.

Annual plants, farinose on the upper parts, but the fruit is too young to allow these specimens to be placed in either species.

Salsola jordanicola *Eig* in Pal. Journ. Bot. J. ser., **3,** 130 : 1945.

Southern Jazira, c. 45 km. N.E. of Ramadi, c. 80 m., undulating sandy desert, erect shrublet 0·1–0·5 m., beautiful transparent pink perianth, colloquial name khidraf, 16.11.1954, *Guest, Rawi and Nuri* 13526, 13533 ; c. 20 km. N.E. of Ramadi, c. 80 m., pebbly desert, delicate pinkish white perianth, 15.11.1954, *Guest, Rawi and Nuri* 13540 ; c. 50 km. N.E. of Ramadi, c. 40 m., dry saline depression (chenopodiaceum), dirty pale pink perianth, 16.11.1954, *Guest, Rawi and Nuri* 13551 ; on the way between Busaiya and Zubair, sandy soil, fodder, common, 20.10.1955, *Serkahia and Tikrity* 15116, 15138 ; near Samawa (c. 12 km. W.S.W.), c. 15 m., occasional, 5.11.1956, *Guest, Rawi and Rechinger* 16009B (R8152) ; c. 28 km. W. by S. of Samawa, 15 m., slightly gravelly sandy desert, occasional, 5.11.1956, *Guest, Rawi and Rechinger* 16024B (R8165) ; near Nasiriya, c. 10 km. S.E. of Ur, c. 10 m., by roadside on alluvial plain, pink, perianth, occasional, 6.11.1956, *Guest, Rawi and Rechinger* 16032 (R8173) ; Salaibiyat al-Hamir, c. 35 km. S. by W. of Ur, c. 15 m., margin of flood plain adjoining sandhill ridge, pale pink frequent or

occasional, 6.11.1956, *do.* 16042 (R8197), 16047 (R8192) ; Southern Desert, c. 50 km. E.S.E. of Busaiya, c. 175 m., hard gravel desert, dirty lemon yellow, rare, colloquial name ghidhdhām, 8.11.1956, *do.* 16104A (R8231) ; Southern Desert, Al-Batin (near Jarishan), c. 100 m., compact sandy soil, pale pink, frequent, colloquial name ghidhām, 9.11.1956, *do.* 16135, 16136 (R8261) ; Kuraz al-Mali, c. 15 km. E.N.E. of Jaliba Station, c. 10 m., higher ground approaching flats surrounding the lake, an arm of the Hor al-Hammar, pale coppery pink, abundant, colloquial name ghidhām, 9.11.1956, *do.* 16138 B ; Bahr al-Milh, c. 30 km. W. by S. of Karbala, c. 20 m., very salty soil with high water table by S. shore of lake, liable to flooding, pale pink almost white, frequent, colloquial names ghidhàm or hummaidh, 20.11.1956, *do.* 16161 (R8329) ; 30 km. W. of Darragi, between Nasiriya and Samawa, 10 m., sandy saline soil, flowers pink, common, 10.11.1956, *Rawi and Alkas* 16250 ; 20 km. N.W. of Karbala, 40 m., sandy gravelly soil with gypsum, flowers pink, common, 12.11.1956, *Rawi and Serkahia* 16275.

Eig. l.c. cites a specimen from 'Iraq among his syntypes ; 130 km. W. of Rutba, 1933, *Eig and Zohary* (not seen). Burtt and P. Lewis in Kew Bull. p. 384 (1954) give a note on this species in Kuwait.
Distr. Palestine, Kuwait.

Salsola jordanicola *Eig* ?

Jabal Sanam (Basra–Kuwait border), 100–150 m., volcanic rocky slopes with sandy places, frequent, 17.4.1955, *Guest, Rawi and Schwan* 14397 ; between Fakka and Musaida, 20 m., silty loam plain, frequent, 21.4.1955, *Rawi* 14982.

These specimens are too immature to be named with certainty but they are farinose on their upper parts and the leaves are too long for them to be included in *S. inermis*.

Salsola near **kali** *L.*

Baghdad, *Colvill* ; Baghdad west, 40 m., waste ground formerly irrigated, with *Alhagi* and *Cynodon*, 0·5 m. tall, leaves succulent and ending in a spine, perianth whitish in fruit, 26.10.1947, *Gillett* 10027 ; Jabal Hamrin above Injana on Kirkuk-Baquba road, 200 m., dry type steppe on gypsaceous sandstone, 27.8.1948, *Gillett* 12497 ; Fakka (Amara) 20 m., sandy soil frequent, 20.4.1955, *Rawi* 14922 ; Baghdad, Rifle Range, Hilla Rd., dry bank, 15.9.1954, *Haines* W 71.

The material seen from 'Iraq, including the specimens previously cited in " The Rustam Herbarium " p. 447 : 1950 (*Guest* 1633 ; *Lazar* 3588 ; *Guest* 3232), has fruits more markedly winged and longer inflorescence branches than British material of *S. kali* ; the leaves are wider than in *S. pestifera* A. Nelson.

S. kali L. was recorded by Handel-Mazzetti p. 142 (1912) from " Im Sande am Tigris bei Finik ober Dschesire ". This specimen has not been seen but may well be the same species as those cited above.

Salsola lancifolia *Boiss.* (*Aellenia lancifolia* (Boiss.) Ulbrich).

Eig in Pal. Journ. Bot. J. ser., **3,** 132 (1945) cites a specimen from 'Iraq : Syrian Desert, 360 km. E. of Damascus, 1933, *Eig and Zohary.*

Salsola longifolia *Forsk.*

Nábělek p. 10 (1929) records a specimen from " Kuh Beijat (Gebel Hamrin) inter Deilerûn [Deh-i-Loran] et oppidum Amara. 27.III.1910 (No. 1150) " as var. *oppositifolia* (Desf.) Murb. ; this variety is presumably the same as *S. oppositifolia* Desf. Fl. Atlant. 1, 219 : 1798. The distribution of *S. oppositifolia* is given by Jahandiez and Maire Cat. Pl. Maroc. **2,** 188 (1932) as Central Spain, Sicily, N. Africa, Canaries. Täckholm Stud. Fl. Egypt 436 (1956) regards *S. oppositifolia* as a synonym of *S. longifolia* Forsk.

The following specimen is possibly in this species. It has a perianth in fruit 6–7 mm. diam. (including wings) :

23 km. W. of Samawa, c. 50 m., hard flat sandy, highly saline (?), common, 26.3.1956, *Guest and Mahallal* 15208.

Distr. (of *S. longifolia*) Central Spain, Sicily, 'Iraq, Egypt, N. Africa, Canary Is.

Salsola rigida *Pall.* and var. **tenuifolia** *Boiss.* Fl. Or. **4,** 963 (1879).

Anthony p. 297 (1935) records this species and the variety ; both from Jabal Hamrin. Var. *tenuifolia* Boiss. is described l.c. as " folia tenuiora filiformi-setacea " citing a specimen " Babylon ad Baghdad (Noe !) ".

Salsola subaphylla *C.A.M.* (*Aellenia subaphylla* (C.A.M.) Aellen).

Aellen deals with this species in Verh. Nat. Gesell. Basel **61,** 172 (1950).

Salsola volkensii *Schw. et Asch.* Ill. Fl. Egypt **2,** 130 (1887).

Zohary p. 48 (1950) records this from the Western Desert. In the original description Schweinfurth and Ascherson compare *S. volkensii* to *S. carinata* C.A.M. and *S. spissa* M.B. with the comment " a quibus differt indumento, perigonii laciniis magis elongatis alis albidis nec rufescentibus ". The species *S. volkensii* is described as " Annua, albido-glaucescens, pilis ramosis villosula ".

Salsola sp.

Southern Jazira (about 45 km. N.E. Ramadi), c. 80 m., undulating sandy desert, low stumpy shrub c. 20 cm. high, pale lemon yellow to apricot perianth, 16.11.1954, *Guest, Rawi and Nuri* 13531.

This species has a rather distinctive general appearance—perennial, twigs divaricate short and tapering with splitting whitish bark, grey lanate leaves, fruiting perianth (including wings) 10–12 mm. diam. The habit differs from *Gillett* 12479 ; there is some resemblance to *S. aurantiaca* Bunge.

Salsola sp.

Jabal Hamrin above Injana, Kirkuk liwa, 200 m., gypsaceous hills, steppe-subdesert, perianth pink, abundant, 27.8.1948, *Gillett* 12479 ; Southern Jazira, near Balad, c. 35 m., alluvial plain with low gravel ridges, region of ancient Ishagi canal, 20.10.1954, *Baltaxe* 13483 ; South-

ern Jazira, c. 50 km. N.E. of Ramadi, c. 80 m., undulating sandy desert, small dull greyish bush, 16.11.1954, *Guest, Rawi and Nuri* 13534 ; Jazira, 50 km. N. by W. of Felluja, 70 m., " haswa " (gravel plain), pale flesh pink, frequent, 18.9.1955, *Guest, Rawi and Kreeb* 14525 ; same loc., magenta red, 18.9.1935, *Guest, Rawi and Kreeb* 14526 ; 28 km. from Sahan on road to Shabicha, fodder, frequent, colloquial name ghidham, 18.10.1955, *coll.* ? 15122 ; Jabal Hamrin near Maqdaduja (=Shahraban), c. 160 m., dry conglomerate hills, green, 11.10.1956, *Guest* 15799 ; c. 12 km. W. by S. of Karbala, c. 60 m., " desert pavement " with vertical gypsum blocks overlapping, occasional, 20.11.1956, *Guest, Rawi and Rechinger* 16156 (R8315) ; c. 30 km. S. of Ramadi, c. 100 m., gypsum desert with gravel, occasional, 21.11.1956, *Guest, Rawi and Rechinger* 16198 (R8355) ; between Shithatha and Rahhaliya, 50 m., salty place, frequent, 12.11.1956, *Rawi and Alkas* 16317 ; Iskandariya (also seen on Felluja and Habbaniya deserts), frequent on gypsum desert, 16.11.1956, *Haines* W75.

This species shows some resemblance to *S. gossypina* Boiss. but that is described as an annual ; it does not seem to be *S. canescens* (Moq.) Boiss., which has longer and flatter leaves, narrower bracts and the perianth has small membranous wings on the young fruit as early as July (in Persian material). The flowers are also less densely lanate in *S. canescens*. This species (12479 etc.) does not show any perianth wings although several specimens have been collected as late as November.

On dissection of the flower of 16198 the following points were noted :— five free membranous perianth segments (without wings at least in flower), five anthers with acute appendages, one or two stigmas, style c. 1 mm. long, ovary globular, embryo spiral.

Salsola spp.

Specimens at Kew :

Hilla, on saltish places, 4.6.1920, *Graham* ; Babylon ruins, near water 7.6.1920, *Graham* ; Khanaqin, 10.11.1929, *Rogers* 0406.

Specimens in the National Herbarium of 'Iraq as well as at Kew :

Gillett 9904, 11547, 11548 ; *Guest* 13146 ; *Guest, Rawi and Nuri* 13557 ; *Guest and Rawi* 14301 ; *Serkahia and Tikrity* 15118, 15125 ; *Guest and Mahallal* 15209 ; *Guest* 15793 ; *Rawi and Serkahia* 16299.

The above specimens are mostly without fruits and some are without flowers so that it is impossible to identify them with any accuracy at present, although it may be possible to place them when the 'Iraq species of this genus are better known.

Seidlitzia rosmarinus *Bunge ex Boiss.* (*Salsola rosmarinus* (Ehrh.) Eig).

There is a note on this species which sets out the differences between it and *Salsola longifolia* Forsk., by Burtt and Lewis in Kew Bull. 386 (1954).

As a genus *Seidlitzia* Bunge does not seem very distinct from *Salsola*.

Spinacia *L.*

A. Female plant with basal flower-glomerules ; terminal lobe of leaves not or not much larger than the lateral lobes . *S. tetrandra* Stev.

A¹ Female plant without basal flower-glomerules, terminal lobe of leaves much larger than the lateral ones . . *S. turkestanica* Iljin

The woody structure surrounding the fruit in *Spinacia*, here regarded as a perianth, is interpreted by some botanists as being composed of bracteoles.

Spinacia tetrandra *Stev.*

Boissier **4,** p. 906 (1879) cites specimens " Babylonia ad Euphratem (Oliv. ! Haussk. !)."

Anthony p. 296 (1935) records it from Amara. Blatter in Journ. Ind. Bot. Soc. **11,** 41 (1932) records a specimen from near Basra.

Spinacia turkestanica *Iljin*

Nasiriya, 23.3.1935, *Yussef Lazar* 565.

This number is cited by Aellen in Ber. Schw. Bot. Gesell. **48,** 488 (1938). Both the species keyed above differ from the cultivated *S. oleracea* L. in having the flowers of the female glomerules united (not free).

Suaeda *Forsk. ex Scop.* Introd. Hist. Nat. 333 (1777).

A. Annual

B. Seed horizontal . . . . . *S. maritima* (L.) Dum.

B¹ Seeds vertical ; perianth enlarged and fleshy in fruit *S. baccata* Forsk. ex Gmel.

A¹ Perennial, sub-shrubs or shrubs

D. Leaves towards lower part of plant generally 1·3–3·3 rarely 4 cm. long, 1·5–3 mm. wide ; stigmas 3–4 ; seeds vertical *S. monoica* Forsk. ex Gmel.

D¹ Leaves shorter

E. Leaves 1–1·5 mm. wide

F. Stigmas 3 ; perianth not enlarged nor fleshy in fruit

G. Leaves ± acute at apex . . *S. hortensis* Forsk. ex Gmel.

G¹ Leaves obtuse or rounded at apex ; seed smooth usually vertical . . . . . *S. fruticosa* (L.) Forsk. ex Gmel.

F¹ Stigmas 4 ; perianth not enlarged nor fleshy in fruit *S. mesopotamica* Eig

E¹ Larger leaves 2 or more mm. wide ; perianth not enlarged in fruit

H. Stigmas 4 ; seed smooth vertical . . *S. mesopotamica* Eig

H¹ Stigmas 3 (-5) ; seed smooth vertical *S. vermiculata* Forsk. ex Gmel.

S. vermiculata can have 3, 4 or 5 stigmas on the same shoot ; in this species the branches in the upper part of the plant are more divaricate than in *S. fruticosa.* Several of the species of this genus are not well known from 'Iraq.

Suaeda fruticosa (*L.*) *Forsk. ex Gmel.* Syst. Nat. ed. 13, **2** (1), 503 (1791).

Basra, N. bank of river opposite Ashar, 2 m., edge of date gardens, occasional, eaten by sheep, but not by cattle (too salt), 30.10.1947, *Gillett* 10039 ; Basra, occasional on waste ground near Isolation Hospital, on island opposite Airport, 21.3.1957, *Haines* W825.

Anthony p. 296 (1935) records this species from Hilla.

Haines W825 has less densely arranged leaves than is usual in this species and is only doubtfully included in it.

Suaeda fruticosa (*L.*) *Forsk. ex Gmel.* var. **brevifolia** *Boiss.* Fl. Or. **4,** 939 (1879).

Blatter in Journ. Ind. Bot. Soc. **11,** 41 (1932) records a specimen of this variety from near Basra, *Whitehead* 173. Boissier l.c. describes it as " folia abbreviata tres lineas sicciter longa."

Suaeda hortensis *Forsk. ex Gmel.* (*Schanginia hortensis* (Forsk. ex Gmel.) Moq.).

Boissier Fl. Or. **4,** 945 : 1879 records " in deserto prope Baghdad (Noë !)."

Ulbrich l.c. p. 558 includes *Schanginia* in the genus *Suaeda* as sect. *Schanginia* (C.A.M.) Volkens.

Suaeda maritima (*L.*) *Dum.*

Handel-Mazzetti p. 142 (1912) records this species " Auf Schlamm zwischen Mendeli und Baladrus östlich von Baghdad (Morck, N. 19)".

Suaeda monoica *Forsk. ex Gmel.*

Anthony p. 296 (1935) records this from Hilla. The following gathering is possibly this species, but shows neither flowers nor fruits :

Half way between Qurna and Basra, 6 m., waste land (salty place), common, 19.4.1955, *Rawi* 15036.

Distr. Palestine, Jordan, Sinai, Arabia, Egypt, Ceylon, India, British E. Africa, Portuguese E. Africa.

Suaeda salsa (*L.*) *Pall.* ? (*Suaeda maritima* (L.) Moq. var. *salsa* (L.) Moq. Chenopod. 128 : 1840).

Handel-Mazzetti p. 142 (1912) cites a specimen from " Kaijara am Tigris unter Mossul, am Asphaltlager (Nr. 3112) " as *S. salsa.*

The following specimens without fruits at Kew have been identified by P. Aellen as doubtfully in this species :

Baghdad, *Colvill* ; 'Iraq, very common in the desert, Mar. 1929, *Rogers* 054 ; Daltawa, eaten by sheep, camels etc., colloquial name tartai, 26.5.1932, *Guest* 2451 ; Nasiriya, widely distributed in the province on cultivated and daim (unirrigated) land, grazed by sheep and more especially camels, local herdsmen say that the camels get scab if this plant is absent from their diet, 15.5.1932, *Barbuti* 2531.

The seeds of Egyptian specimens named as *S. salsa* (e.g. Lake Mariut, 28.9.1951, *Thoday* E17) are c. 1 mm. long, while in European material named as *S. maritima* the seeds are 1–2 mm. long. The reticulation of the testa seems about the same in both. The perianth is stated by Boissier Fl. Or. **4,** 942 (1879) to be very fleshy in *S. salsa*, but this point is difficult to estimate in herbarium material. At present *S. salsa* and *S. maritima* cannot be satisfactorily distinguished from each other in a key to the 'Iraq species.

Suaeda sp.

Shithatha (c. 42 km. W. of Karbala), c. 40 m., low-lying marshy land with high water-table and saline, frequent, 20.11.1956, *Guest, Rawi and Rechinger* 16173 (R8337) ; 10 km. N.W. of Rumaitha, c. 10 m., irrigated field salty soil, frequent, 10.11.1956, *Rawi and Serkahia* 16257.

An annual species with rather short and broad leaves. It shows some resemblance to *S. microsperma* (C.A.M.) Fenzl from Transcaspia (*Sintenis* 2195, *Litwinow* 636).

Suaeda sp.

30 km. W. of Darragi between Nasiriya and Samawa, c. 15 m., sandy saline soil, 10.11.1956, *Rawi and Alkas* 16241.

This specimen has bracts up to 4 mm. wide, 3 stigmas and a vertical seed.

Suaeda sp.

20 km. N. of Amara, 10 m., irrigated field, common, 21.4.1955, *Rawi* 15008 ; halfway between Qurna and Basra, 6 m., waste land (salty soil), common, 19.4.1955, *Rawi* 15036A.

These two specimens appear to be the same species but are too young to identify more accurately.

Traganum nudatum *Del.*

8 km. E. of Shithatha, Karbala liwa, sandy wadi near salty lake, in subdesert, flower yellow, green leaves succulent half-flattened, to 1·3 m. tall, occasional, 11.3.1947, *Rawi and Gillett* 6475 ; Southern Desert, Al-Batin (Kuwait Border, 100 km. S.E. of Busaiya), c. 150 m., compact sandy soil, abundant, colloquial name dhumran, 28.3.1956, *Guest and Mahallal* 15249.

Distr. Pal., Egypt, Algeria, Libya.

Chenopodiaceae spp.

Rawi 14702, 14708, 14714, 15007 ; *Guest and Rawi* 15959. Material inadequate for more accurate identification.

THELIGONACEAE

Theligonum cynocrambe *L.* (*Cynocrambe prostrata* Gaertn.).

Expedition to the Euphrates, *Chesney* 124.

Chesney's specimens are only doubtfully from 'Iraq, but Boissier Fl. Or. **4,** 897 (1875) records as specimen as " Mesopotamiae mons Sindjar (Haussk. !) ".

NOTES ON AFRICAN ROSACEAE : IV.*

R. A. Graham

Synonymy in Rubus

Type specimens of certain brambles from Belgian Congo and South Africa recently received on loan from Brussels and Lund enable the following reductions into synonymy to be made.

Rubus rigidus Sm. forma *umbrosus* C. E. Gust. in Ark. Bot. 26 (7) : 58 (1934). Types : *1930–1931 Exped. Suecic. in Afr.* 303, 241a, 709 (LD, syn. !) = **R. rigidus** *Sm.*

Rubus rigidus Sm. forma *lachnocarpus* C. E. Gust., l.c. Types : *1930–1931 Exped. Suecic. in Afr.* 4720, 3861 (LD, syn. !) = **R. rigidus** *Sm.*

Rubus rigidus Sm. var. *incisus* C. E. Gust., l.c. 60. Type : *1930–1931 Exped. Suecic. in Afr.* 3475 (LD, holo. !) = **R. rigidus** *Sm.*

Rubus pinnatus Willd. forma *glaber* C. E. Gust., l.c. 46. Types : *1930–1931 Exped. Suecic. in Afr.* 710, 588 (LD, syn. !) ; *Rudatis* 127, 1957 (syn.) = **R. pinnatus** *Willd.* var. **pinnatus.**

Rubus apetalus Poir. forma *pyramidalis* C. E. Gust. in B.J.B.B. 13 : 274 (1935). Types : Ruwenzori, *Bequaert* 4241, 4241 bis (B, syn. !) = **R. apetalus** *Poir.* var. **apetalus.**

In addition, one of the syntypes of *Rubus pinnatiformis* C. E. Gust. (in Arkiv. Bot. 26 (7) : 48 (1934). Types : *1930–1931 Exped. Suecic. in Afr.* 2726 (LD, syn. !), 3866 (syn.) was examined. This species is probably a minor variant of *R. pinnatus* Willd. var. *pinnatus*, but requires additional study with further material.

An example of *Rubus rigidus* Sm. var. *mundtii* (Cham. & Schldl.) Focke (= *R. mundtii* Cham. & Schldl.), from Southern Rhodesia, Inyanga Mts. (1930–1937 *Exped. Suecic. in Afr.* 26/3 (LD)), is merely a variant of *R. rigidus*. The type of this variety has, however, not been seen.

*Continued from Kew Bull. 1957, 428.

***Pruning.**—By the aid of well-chosen illustrations, pruning operations are shown in detail stage by stage. We are told that this book is primarily intended for beginners who will find here a helpful guide to this most important garden operation. Trees and shrubs, fruit trees, root pruning, bark ringing, soft fruit pruning, vine pruning, etc., are all clearly described and illustrated in this useful book containing over 130 photographs and line drawings, many of them showing the author actually performing the work described.

†Amateur Gardening Annual. –The 1958 edition of this annual contains a number of interesting contributions from horticultural experts and specialists with many excellent illustrations. It will be welcomed by all garden lovers.

H. S. Marshall

*Pruning. "Amateur Gardening" Picture Book no. 9. By J. P. Wood. Pp. 60. Over 130 photographs and line drawings. 7/6d. 1957.

†Amateur Gardening Annual 1958. Edited by A. G. L. Hellyer. Pp. 139. Illus. 6/-.

ULMUS CANESCENS : AN EASTERN MEDITERRANEAN ELM.

R. Melville

A preliminary account of the elms of Western Thrace was made by H. G. Tedd and W. B. Turrill as long ago as 1933 (Kew Bull., 232, 1933). At the time, it was possible to assign only tentative names to the different forms, partly on account of the complexity of the problem but more to the lack of suitable material for study. The statement by these authors, that " there has been little detailed study of the elms of the Balkan Peninsula, chiefly owing to the lack of adequate material " is as true today as when it was made. However, in the intervening years some additional material has accumulated from the Balkans and adjacent countries and a critical account can now be given of one of the hitherto unrecognised species that contribute to the Balkan elm complex. In doing so, emphasis has been placed on the lateral spur shoots, or short-shoots, of the crown of the tree, which provide numerous characters of taxonomic value.

Ulmus canescens *Melville*, sp. nov., *U. carpinifoliae* Gleditsch affinis, forma serraturaque foliorum et indumento albido molli foliorum ramulorumque differt.

Arbor media vel magna. Ramuli primum fulvi vel pallide badii, 1·5–2·0 mm. diamentro, dense molliterque albo-pubescentes, deinde secundo anno glabri cinereo-brunnei vel albo-cinerei fiant. Gemmae maturae anguste ovatae, 4–5 mm. longae, perulae atro-brunneae, semi-orbiculatae vel late ovatae, concavae, apicibus rotundatis, marginibus longe ciliatis et dorsis pilis albidis appressis indutis. Folia distalia et subdistalia ramulorum brevium ovato-elliptica acuta, basibus asymmetricis, eis laterum longiorum anguste usque late semicordatis eis laterum breviorum rotundatis vel anguste semicordatis, marginibus obtuse serratis, breviter ciliatis, serraturis convexo-serratis, simplicibus vel dentibus 1–2 munitis, supra subglabra haud scabra, subtus dense incano-pubescentia et fasciculis pilorum parvis albis in axillis nervorum praedita ; nervi laterales in jugis 12–16 vel usque 18 dispositi ; petioli dense pubescentes 5–7 mm. longi ; forma foliorum proximorum late ovata acuta basi oblique subcordata. Flores circa 20–30 fasciculatis ; perianthium 2·5–3·0 mm. longum lobis 5–8 obtusis longe ciliatis ; stamina 4–5 ; samarae late obovatae apicibus rotundatis basibus late cuneatis vel suborbiculatae apicibus basibusque rotundatis, 12–15 mm. latae, 14–18 mm. longae, stylis incurvis.

Greece. Thrace : Karakeuy, leaves 17.5.1932, flowers 20.2.1932, fruits 26.4.1932, H. G. Tedd 806 (K. holotype), also Tedd 803 ; Boyadjiler, 17.5.1932, Tedd 799, 818 ; Sakarka, 14.5.1932, Tedd 807, 809, 810, 811 ; Ferizli, 1930, Tedd 127E, 127F ; Kaya Bounar, 25.4.1938, Tedd 2141. Macedonia : Lake Kerkinis, 26.6.1933, Tedd 1128 A, B & C. Corinthia and Argolis : Dervenaki (Nr. Mycenae), May 1931, S. C. Atchley 1088.

Jugoslavia. Scutomore, Aug. 1950. B. Zlatarić.

Italy. Taranto : Gravina di Leucarpide, April 1905, Lacaita 2154 (B.M.) ; Gravina di Montespecchi, 3.5.1920, Lacaita 2139 (B.M.).

Sicily. Fl. Sicula exsicc., Todaro 1397 (K., B.M.).

Cyprus. Lapithos, May 1948, H. Omer ; Lythrodonta, Nov. 1947, W. A. Gordon.

Israel. Mishmar Haemek, March, June, 1954, M. Chudnoff ; Hazorea, Feb., March, June 1954, M. Chudnoff ; Nathanya 30.5.1953, Dept. Forests.

Turkey. Isparta : Belkis, 29.3.1936, T. A. Tengwall 207.

The comparatively small number of specimens available for citation can give only an imperfect conception of the distribution of the species. From Greece it probably extends northwards into Roumania. The plant illustrated by Beldie as "*U. foliacea*" in Săvulescu, Fl. Reipub. Pop. Roman **1,** 341, t. 49, fig. 2 (1952) may be this species, or one of its hybrids. One specimen has been received from Jugoslavia, but several others appear to be hybrids of this species. Also, material at Kew of the

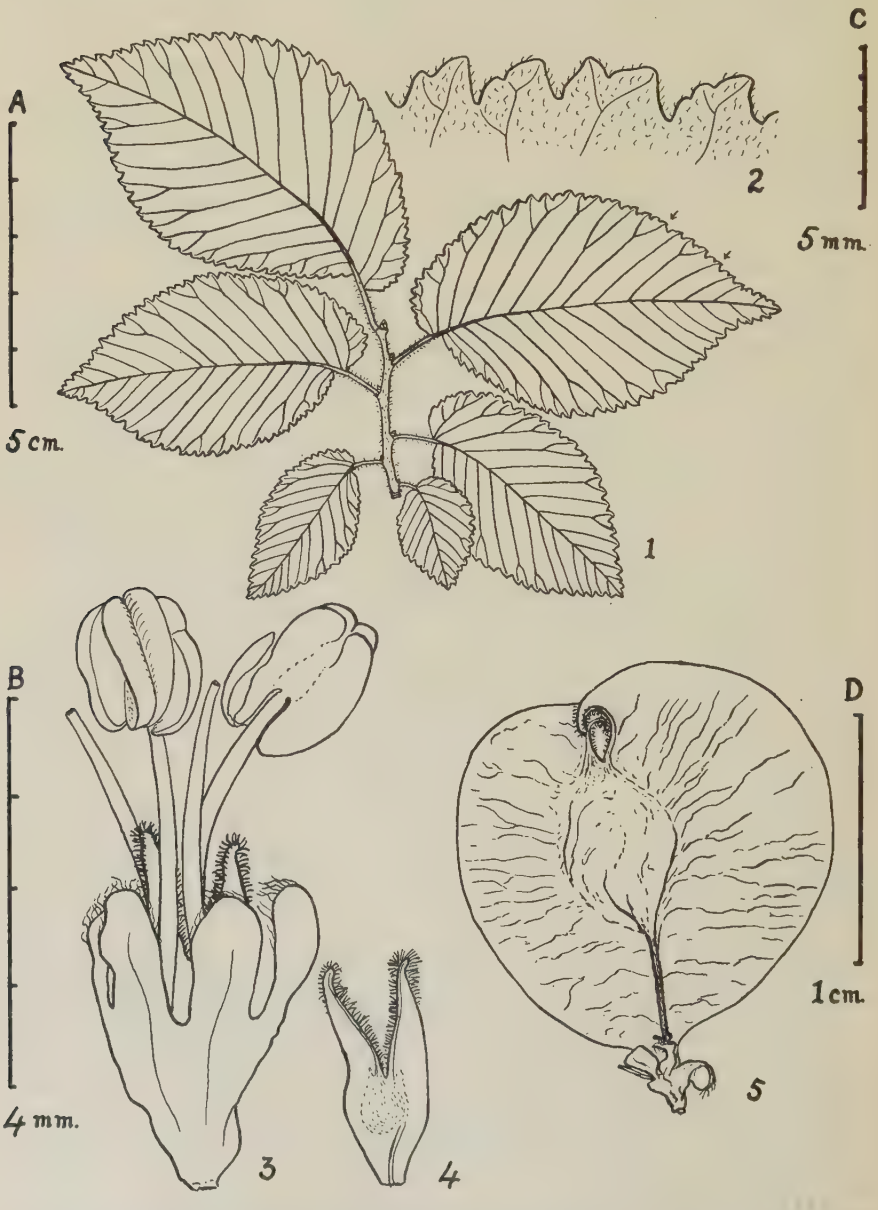


Fig. 1. *Ulmus canescens* Melville : 1, a typical short-shoot, scale A ; 2, serrature of the marked portion of the subdistal leaf of 1, scale C ; 3, 4, flower and ovary, scale B ; 5, fruit, scale D. All from the holotype.

type collection of *U. campestris* L. var. *dalmatica* Baldacci in Fl. Montenegro **4,** 78 (1891) exhibits characters that are consistent with a hybrid origin from this and another undescribed species of elm. The few specimens from Southern Italy and Sicily have rather large leaves, but otherwise fall within the range of variation of the species as here defined. An immature specimen from Cyrenaica, too poor for definite recognition, suggests that the species extends into this part of North Africa. It is in Cyprus and should be sought for in Crete. The occurrences in Israel are probably relicts of a former more extensive range, now contracted into a few valley bottoms, where the valley alluvium is supplied with permanent water. A few leafless twigs from the vicinity of Aleppo suggest that the tree is to be found in Syria. This would form a link between the Israel and Turkish records. Elms in general appear to be rather scarce and localised in Asia Minor, but Dr. Tengwall's collection from Belkis, if the place has been correctly identified, was obtained not far from another village with the significant name of Karagatch (i.e. elm). Present information on the range of the species may be summarised by stating that it encircles the Eastern Mediterranean basin, occurring sporadically where suitable conditions exist.

As in other elm species, appreciable variation in leaf shape occurs, but this conforms to a regular plan. Other characters, such as the leaf serrature, the indumentum and branch and bud characters remain substantially unaltered through the whole series. The principal change in leaf shape within the species is one of relative breadth, in which the curves of the leaf outline flatten or bulge out, but without any fundamental change in shape. The shapes of corresponding leaves from different individuals varying in this way can be arranged in an arithmetical series. This kind of variation has already been discussed in connection with *U. carpinifolia* Gleditsch (Melville, J. Linn. Soc., Bot. **53,** 83–90, 1946). The specimen chosen as holotype falls approximately into the mode of this series ; the mean shape of the subdistal leaves of its short-shoots is shown in fig. 2 B and was obtained by the technique described earlier (Melville, Ann. Bot. N.S. **1,** 673–680, 1937). Individuals in the broadest leaf range have subdistal leaves approximating to that of fig. 2 A. In the narrower range, the plants bear subdistal leaves similar to those shown as outlines in figs. 2 D. and 2 F, or somewhat narrower. The distal leaves are commonly narrower than the subdistals, figs. 2 C and 2 E, and tend to produce the most extreme variants of leaf shape. The inflexion of the margin on the short side of the leaf in fig. 2 E is not fortuitous, but is the result of a systematic change in the balance of morphogens controlling respectively the length and breadth of the leaf during its growth. A shape like that of fig. 2 E would be produced from the modal shape of the species fig. 2 B, by an elongation of the leaf among the midrib as axis, with a rapid decline on the rate or degree of elongation from the base toward the apex. An analogous example of this phenomenon was discussed in *U. coritana* Melville (J. Linn. Soc., Bot. **53,** 263–271, 1949). The distal and subdistal leaves of individuals of *U. canescens* subject to this type of variation may become very asymmetrical and oblique and assume an almost parallelogram-like shape.

Although the elm populations of the Eastern Mediterranean region are imperfectly represented in British herbaria there is, nevertheless, evidence

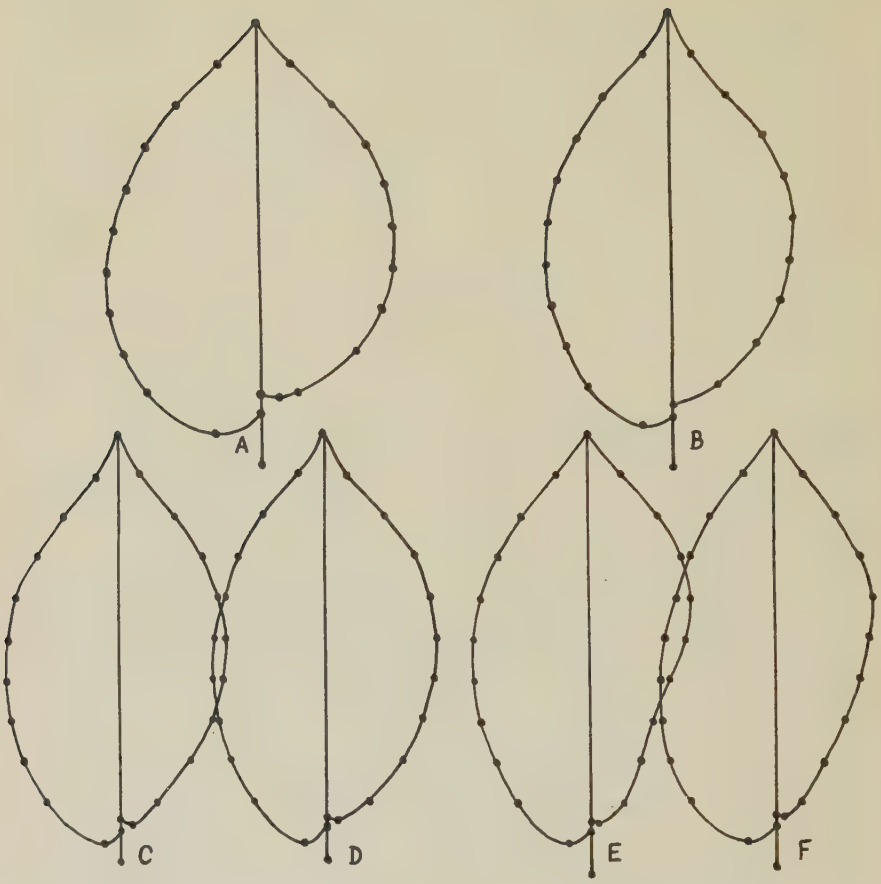


FIG. 2. Mean leaf shapes of distal and subdistal leaves of the short-shoots in *Ulmus canescens* Melville, to illustrate the range of variation within the species. A, subdistal leaf of Tedd 810 from Sakarka, Thrace ; B, subdistal leaf of Tedd 806 from Karakeuy, Thrace (holotype) ; C, distal and D subdistal leaves from Mishmar Haemek, Israel, comm. M. Chudnoff, 1954 ; E, distal and F, subdistal leaves from Lythrodonta,Cyprus, coll. W. A. Gordon, 1947.

that *U. canescens* hybridises with other species. The opinion that " *U. campestris* var. *dalmatica* Baldacci is a hybrid has already been expressed. Of the elms collected by H. G. Tedd in Thrace and discussed by Tedd and Turrill (loc. cit. supra), no. 797 from Boyadjiler is *U. canescens* × *U. glabra* Huds. and nos. 800 and 801 from Boyadjiler and 805 from Karakeùy show some introgression from *U. carpinifolia* Gled. Among the elms of the Balkans are trees with a leaf shape and serrature very similar to that of the broader leaved forms of *U. canescens*, but with glabrous or very scantily pubescent branchlets, sparingly pubescent leaves and smaller fruits. Similar trees occur in Iraq. The relationships of these elms to *U. canescens* is at present obscure. Well collected specimens of elms from the Balkans and Near East are much needed to enable this and other problems to be worked out.

THE IDENTITY OF FERONIELLA PUBESCENS TANAKA (RUTACEAE).

L. L. Forman

There is a specimen in the Wallich Herbarium, no. 6365 from Taong Dong, Burma, which is listed in the Wallich Catalogue as " *Limonia* ? *pubescens* Wall.". The sheet bears sterile, leafy shoots and a single detached fruit. J. D. Hooker in Fl. Brit. India **1,** 507 (1875) gave a description of the Wallich specimen under " ? *Limonia pubescens* Wall.", but suggested that the fruit probably belonged to another plant.

Tanaka, in his studies on the *Aurantioideae* of Indo-China in Bull. Mus. Hist. Nat. Paris sér. 2. **2,** 161 (1930), referred Wallich 6365 to a new species of *Feroniella* Swingle together with specimens from Indo-China, Siam and Java. He named this species *Feroniella pubescens*, quoting Wallich's *nomen* as a synonym, and citing Zollinger 493 from Java as " *typus* " and Wallich 6365 as " *paratypus* ".

Zollinger 493, however, was cited by Planchon in Hooker's London Journ. Bot. **5,** 570 (1846) under *Lasiolepis bennetii* Planchon, which is a synonym of *Harrisonia perforata* (Blanco) Merr. in the *Simarubaceae*. This is undoubtedly the correct determination for the specimen of Zollinger 493 at Kew as well as for Wallich 6365 (including the fruit). *Feroniella pubescens* Tanaka must therefore be regarded as a synonym of *Harrisonia perforata* (Blanco) Merr.

Tanaka's description contains the misleading statement " stamina multa ", although Zollinger 493 has only 10 stamens, i.e. twice the number of petals, which is characteristic for *Harrisonia*. In *Feroniella* the number of stamens is 16–20, i.e. four times the number of petals. The structures of the ovary and fruit are entirely different in the two genera. The ovary of *Harrisonia* has 4–5 separate loculi each containing a single, pendulous ovule, while the ovary of *Feroniella* has 5–6 loculi, which soon become confluent, each containing numerous ovules on a parietal placenta. Tanaka did not mention the ovary structure of *F. pubescens*. He described the fruit from an allegedly immature condition, but his description clearly applies to the normal, small 2–7-lobed berry of *H. perforata* which is so different from the large, *Citrus*-type fruit of *Feroniella*.

According to Swingle, *Feroniella* is distinguished from all other genera in the *Aurantioideae* by the pilose appendage at the base of each filament. Since similar appendages occur in *Harrisonia*, this character possibly led Tanaka to refer a specimen of this genus to *Feroniella*. There is some similarity between the impari-pinnate leaves of the two genera, but the typically rutaceous gland-dots found towards the leaflet margins in *Feroniella* are absent in *Harrisonia*.

The following references and synonymy are to be added to those given by Merrill in his Enum. Philipp. Fl. Pl. **2,** 346 (1923).

Harrisonia perforata (*Blanco*) *Merr.* in Philipp. Journ. Sci. Bot. **7,** 236 (1912) ; Craib, Fl. Siam. Enum. **1** (2), 243 (1926) ; Gagnepain in Suppl. Fl. Gén. Ind.-Ch. **1** (5), 659 (1946).

Lasiolepis bennetii Planchon in Hook. Lond. Journ. Bot. **5,** 570 (1846) incl. *var. paucijuga* (Benn.) Planchon et *var. multijuga* (Benn.) Planchon.

Limonia pubescens Wall. ex Hook. f., Fl. Brit. India **1,** 507 (1875).

Feroniella pubescens Tanaka in Bull. Mus. Nat. Hist. Paris sér. 2. **2,** 161 (1930) ; Engler in Engler et Prantl, Pflanzenfam. ed. 2. **19a,** 354 (1931) ; Swingle in Botany of Citrus and its Wild Relatives 470 (1943) ; Guillaumin in Suppl. Fl. Gén. Ind.-Ch. **1** (5), 651 (1946).

[*Feronia elephantum* (non Corr.)—Moritzi, Syst. Verzeichn. Zoll. 24 (1845–46)].

Poisons and Pictures.*—No doubt the stockowners of Western Australia have long felt the need for a reliable and comprehensive account of the poisonous plants of the state. Their requirements have now been met right royally by the publication of Gardner & Bennetts' book which marries a lifetime of botanical experience, in the one, with an equally extensive knowledge of the veterinary and toxicological aspects of poison plants in the other. The whole is crowned by a supplement of 52 coloured plates depicting the more important toxic plants, which reaches such a high degree of excellence, that to many it would provide a sufficient excuse for buying the book. These pictures are reproductions of water colour drawings, mostly by Edgar Dell, but a number by Gardner himself, in which he appears equally capable as artist or botanist. While botanist and layman will delight in the beauty of this sample of the Western Australian flora, the stockowner will find in it the simplest means of recognising dangerous plants. The plants are treated in systematic order. Each species has a short description, followed by an account of its toxicity, the symptoms produced and post mortem appearances. Little is known of the nature of the active substances in the majority of the plants, but the scanty information available has been included. The *Leguminosae* constitute by far the most numerous group of toxic plants, the discussion of which occupies about a third of the book. Outstanding among them are the two genera *Gastrolobium* and *Oxylobium* for which a key is provided to lighten the task of identification, as well as thirty six of the colour plates. The stockowner will also derive help from an appendix, which lists the plants occurring in each district, since many are limited in their distribution. The book is a valuable addition to the literature of toxic plants.

R. Melville.

---

* The Toxic plants of Western Australia by C. A. Gardner and H. W. Bennetts, pp. xxix + 253, tt 52 + 45 text figs. West Australian Newspapers Ltd., Perth. 1956. £A2. 10.